Australian Government

Australian Pesticides and Veterinary Medicines Authority

Public Release Summary

on the evaluation of the new active glufosinate-P-ammonium in the products Basta Ultra Herbicide and Liberty Ultra Herbicide

APVMA product numbers 94734 and 94738

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This publication is available from the APVMA website.

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Preface

The Australian Pesticides and Veterinary Medicines Authority (APVMA) is the Australian Government regulator responsible for assessing and approving agricultural and veterinary chemical products prior to their sale and use in Australia. Before approving an active constituent and/or registering a product, the APVMA must be satisfied that the statutory criteria, including the safety, efficacy, trade, and labelling criteria, have been met. The information and technical data required by the APVMA to assess the statutory criteria of new chemical products, and the methods of assessment, must be consistent with accepted scientific principles and processes. Details are outlined on the APVMA website.

The APVMA has a policy of encouraging transparency in its activities and seeking community involvement in decision making. Part of that process is the publication of Public Release Summaries for products containing new active constituents. This Public Release Summary is intended as a brief overview of the assessment that has been conducted by the APVMA and of the specialist advice received from advisory agencies, including other Australian Government agencies and State departments of primary industries. It has been deliberately presented in a manner that is likely to be informative to the widest possible audience to encourage public comment.

About this document

This Public Release Summary indicates that the APVMA is considering an application for registration of an agricultural or veterinary chemical. It provides a summary of the APVMA's assessment, which may include details of:

- the toxicology of both the active constituent and product
- the residues and trade assessment
- occupational exposure aspects
- environmental fate, toxicity, potential exposure and hazard
- efficacy and target crop or animal safety.

Comment is sought from interested stakeholders on the information contained within this document.

Making a submission

In accordance with sections 12 and 13 of the Agvet Code, the APVMA invites any person to submit a relevant written submission as to whether the application for registration of Basta Ultra Herbicide and Liberty Ultra Herbicide should be granted. Submissions should relate only to matters that the APVMA is required, by legislation, to take into account in deciding whether to grant the application. These matters include aspects of public health, occupational health and safety, chemistry and manufacture, residues in food, environmental safety, trade, and efficacy and target crop or animal safety. Submissions should state the grounds on which they are based. Comments received that address issues outside the relevant matters cannot be considered by the APVMA.

Submissions must be received by the APVMA by close of business on 24 March 2026 and be directed to the contact listed below. All submissions to the APVMA will be acknowledged in writing via email or by post.

Relevant comments will be taken into account by the APVMA in deciding whether the product should be registered and in determining appropriate conditions of registration and product labelling.

When making a submission please include:

- a contact name
- the company or organisation name (if relevant)
- an email or postal address (if available)
- the date you made the submission.

Please note: submissions will be published on the APVMA website unless you have asked for the submission to remain confidential, or if the APVMA chooses at its discretion not to publish any submissions received (refer to the public consultation coversheet).

Please lodge your submission using the public consultation coversheet, which provides options for how your submission will be published.

Note that all APVMA documents are subject to the access provisions of the *Freedom of Information Act 1982* and may be required to be released under that Act should a request for access be made.

Unless you request for your submission to remain confidential, the APVMA may release your submission to the applicant for comment.

Written submissions should be addressed to:

Case Management Team – Pesticides
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Phone: +61 2 6770 2300
Email: casemanagement@apvma.gov.au.

Further information

Further information can be obtained via the contact details provided above.

Copies of technical evaluation reports covering chemistry, efficacy and safety, toxicology, occupational health and safety aspects, residues in food and environmental aspects are available from the APVMA on request.

Further information on Public Release Summaries can be found on the APVMA website.

Introduction

This publication provides a summary of the data reviewed and an outline of the regulatory considerations for the proposed registration of Basta Ultra Herbicide and Liberty Ultra Herbicide, and approval of the new active constituent, Glufosinate-P-ammonium.

Applicant

BASF AUSTRALIA LTD.

Purpose of application

BASF AUSTRALIA LTD has applied to the APVMA for registration of the new products Basta Ultra Herbicide and Liberty Ultra Herbicide, containing 211 g/L, as a Soluble Concentrate (SL) formulation of the new active constituent Glufosinate-P-ammonium.

This publication provides a summary of the data reviewed and an outline of the regulatory considerations for the proposed registration of the products Basta Ultra Herbicide and Liberty Ultra Herbicide, containing the new active constituent Glufosinate-P-ammonium.

Proposed claims and use pattern

Basta Ultra Herbicide: For non-residual control of broadleaf and grass weeds in various situations.

Liberty Ultra Herbicide: For non-residual control of certain broadleaf and grass weeds in LibertyLink® Canola varieties (with tolerance to Liberty® Ultra Herbicide), fallow and optical spot spray technologies (OSST).

Mode of action

Glufosinate-P-ammonium belongs to the phosphonic/phosphinic acids chemical class. In plants, it acts by inhibiting the enzyme glutamine synthetase, which leads to reduction in glutamine levels, accumulation of ammonia, plant tissue necrosis and plant death.

Overseas registrations

Product containing glufosinate-p-ammonium has recently been registered in the USA for control of weeds in conventional and glufosinate-resistant field corn, sweet corn, soybean, cotton, and canola. An application has been submitted to other countries around the world, including submission in the NZ.

Chemistry and manufacture

Active constituent

The active constituent glufosinate-P-ammonium is manufactured overseas. Details of the chemical name, structure, and physicochemical properties of glufosinate-P-ammonium are listed below in Tables 1 to 2.

Table 1: Nomenclature and structural formula of the active constituent glufosniate-P-ammonium

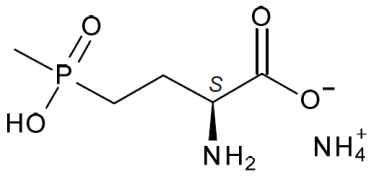
Common name (ISO):	Glufosinate-P-ammonium
IUPAC name:	ammonium [(3*S*)-3-amino-3-carboxypropyl] methylphosphinate
CAS registry number:	73777-50-1
Molecular formula:	$C_5H_{15}N_2O_4P$
Molecular weight:	198.1 g/mol
Structural formula:	

Table 2: Key physicochemical properties of the active constituent glufosinate-P-ammonium

Physical form:	Powder
Colour:	White
Odour:	Odourless
Melting point:	118-121 °C
Boiling point:	No boiling point detectable before decomposition at 212 ºC
Relative density	1.415 (91.1% at 20 ºC) 1.511 (90.3% at 20 ºC)
Stability:	Glufosinate-P-ammonium is expected to remain in compliance with its specifications when stored under normal conditions for up to 2 years and is not adversely affected by the presence of metals or metal ions. Glufosinate-P-ammonium is stable in the presence of aluminium acetate and iron (II) acetate, at 25 °C and 54 °C.
Safety properties:	Not flammable, not explosive, not corrosive to metals, no oxidising or reducing properties
Solubility in water:	>1000 g/L in pure water, at pH 4, pH 7 and pH 9, at 20 °C
Organic solvent solubility:	n-Heptane <0.01 mg/L Toluene <0.01 mg/L Dichloromethane <0.01 mg/L Acetone 0.037 mg/L Ethyl acetate <0.01 mg/L
Dissociation constant (PK_a):	no measurable dissociation constant
PH:	1.0% (w/w) in pure water: pH 6.9 1.0% (w/w) in CIPAC water D: pH 6.8
Octanol/water partition coefficient (Log K_{ow}/K_{OW}):	Buffer pH 4: log P_{OW} = -4.58 ± 0.112 Buffer pH 7: log P_{OW} = -5.26 ± 0.151 Buffer pH 9: log P_{OW} = -5.40 ± 0.15
Vapour pressure:	p = 3.4 × 10^{-14} Pa (20 °C) p = 2.9 × 10^{-13} Pa (25 °C)

<table>
<tr><td>Henry's law constant:</td><td>2.0 × 10^{-14} Pa·m^3·mol^{-1}</td></tr>
<tr><td>Optical purity</td><td>Specific rotation: +2.53 mL·dm^{-1}·g^{-1} (in H_2O at 589 nm and 20 °C)</td></tr>
<tr><td>UV/VIS absorption spectra:</td><td>Molar extinction coefficients ε in L·mol^{-1}·cm^{-1} (wavelength):
<table>
<tr><td>Distilled water (neutral)</td><td>0.1 N aqueous HCl</td><td>0.1 N aqueous NaOH</td></tr>
<tr><td>382.02 (193.00 nm)</td><td>57.05 (207.25 nm)</td><td>108.67 (216.75 nm)</td></tr>
<tr><td>3.12 (291.00 nm)</td><td>0.31 (291.00 nm)</td><td>* (291.00 nm)</td></tr>
</table>
*No absorption</td></tr>
</table>

Formulated products

The products Basta Ultra Herbicide and Liberty Ultra Herbicide have the same physicochemical properties. They will be manufactured in Australia and overseas. Tables 3 and 4 outline some key aspects of the formulation and physicochemical properties of the products.

Basta Herbicide and Liberty Ultra Herbicides are aqueous soluble concentrate (SL) herbicides containing 211 g/L of the active constituent glufosinate-P-ammonium. They will be supplied in 1–1000 L HDPE containers.

Table 3: Key aspects of the formulation of the product Basta Ultra Herbicide and Liberty Ultra Herbicide

Distinguishing name:	Basta Ultra Herbicide and Liberty Ultra Herbicide
Formulation type:	Soluble concentrate (SL)
Active constituent concentration/s:	211 g/L Glufosinate-P-ammonium

Table 4: Physicochemical properties of the products Basta Ultra Herbicide and Liberty Ultra Herbicide

Physical form:	Clear magenta liquid
Odour:	Faint ammonia odour
PH:	1.0% (w/w) in CIPAC water D: pH 5 – 9
Density:	1.11 – 1.15 g/mL at 20 ºC
Persistent foam:	0.8% and 5.0% aqueous dilutions with and without 0.025 mL/L of an antifoaming agent: Maximum 60 mL foam after 1 minute
Dilution stability:	0.8% and 5.0% aqueous dilutions in CIPAC water D: After standing at 30 ± 2 °C for 24 hours, a clear or opalescent solution, free from more than a trace of sediment and visible solid particles. Any visible sediment or particles produced shall pass through a 75 µm sieve.
Safety properties:	Not flammable, not explosive, no flash point up to 108 ºC. no oxidising properties
Storage stability:	The product is expected to remain within specifications for at least 2 years when stored under normal conditions in HDPE containers.
Low temperature storage stability:	Stable at 0 ± 2 ºC

Recommendations

The APVMA Chemistry section has evaluated the chemistry of the new active constituent glufosinate-P-ammonium and associated products Basta Ultra Herbicide and Liberty Ultra Herbicide, including the manufacturing processes, quality control procedures, stability, batch analysis results and analytical methods, and found them to be acceptable. The available storage stability data indicate that the formulated products are expected to remain stable for at least 2 years when stored under normal conditions.

Based on a review of the chemistry and manufacturing details, the registration of Basta Ultra Herbicide and Liberty Ultra Herbicide, and approval of the active constituent glufosinate-P-ammonium, are supported from a chemistry perspective.

Toxicological assessment

Glufosinate-P-ammonium (the S-enantiomer) was approved by the APVMA in March 2024. The APVMA has previously approved (2015) the technical grade active constituent, glufosinate ammonium, a racemic mixture of the S- and R-enantiomers (1:1). In this PRS only studies considered relevant in determining whether Basta and Liberty, as the first products to be registered containing solely the S-enantiomer, have different hazard profiles to racemic glufosinate ammonium.

Evaluation of toxicology

The acute and repeat-dose inhalation toxicity studies with glufosinate-P-ammonium (the S-enantiomer) have shown that it is generally no more toxic that the racemic parent compound, glufosinate ammonium.

Chemical class and critical effects

Glufosinate ammonium belongs to the phosphonic/phosphinic acids chemical class. In plants, it acts by inhibiting the enzyme glutamine synthetase (GS), which leads to reduction in glutamine levels, accumulation of ammonia, plant tissue necrosis and plant death. In mammals, glutamine synthetase is an important enzyme involved in the maintenance of nitrogen homeostasis. In mammals, glufosinate ammonium has been shown to inhibit GS activity in the brain, liver and kidneys.

Pharmacokinetics

No additional data was provided for glufosinate-P-ammonium.

Acute toxicity (active constituent)

Glufosinate-P-ammonium has low toxicity by the oral, dermal and inhalation routes. It is not irritating to the skin but is slightly irritating to the eyes of rabbits. In a local lymph node assay (LLNA) in mice, there was no evidence of any skin sensitisation.

Acute toxicity (product)

Basta Ultra Herbicide and Liberty Ultra Herbicide have very low toxicity by the oral route, low toxicity by the dermal and inhalation routes, are severely irritating to the eyes and have moderate skin irritation potential but are not skin sensitisers in the mouse LLNA test.

Repeat-dose toxicity

In a 5-day range-finding inhalation study (6 h/d), rats readily tolerated daily exposures (nose-only) to an average glufosinate-P-ammonium aerosol concentration of 100 mg/m^3. In a follow-up study at 28-days, there were no adverse effects, and the NOAEC was determined to be 300 mg/m^3, the highest concentration tested. GS activity was not measured.

In a 5-day dermal toxicity study, rats showed no signs of systemic toxicity or skin irritation at doses up to 1000 mg/kg bw/d. GS activity was not measured.

In a 4-week dietary study in mice, GS activity in the brain was inhibited by more than 10%, following exposure at 40 ppm (13.4 mg/kg bw/d) and a NOAEL could not be established. However, in a subsequent 90-day dietary study, GS activity in the brain was only inhibited at doses greater than 53 mg/kg bw/d.

In 4-week (range finding) then 14-week dietary exposure studies in rats, a NOAEL of 250 ppm (18.5 mg/kg bw/d) was determined based on reductions in several haematological parameters (ie. RBC, Hb and MCHC) together with increases in plasma and urinary ammonia levels at higher doses. GS activity was not measured.

In a 13-week dietary study in dogs, reductions in GS activity in the brain were in excess of 10% at all tested doses, so a NOAEL could not be established. The lowest tested dose was 85 ppm (2 mg/kg bw/d).

Genotoxicity

No evidence for genotoxicity was observed in any of the guideline-compliant assays on glufosinate-P-ammonium.

Chronic toxicity and carcinogenicity

No additional data was provided for glufosinate-P-ammonium. In view of the lack of genotoxicity and the absence of carcinogenicity in mice and rats in chronic studies with racemic glufosinate ammonium, glufosinate-P-ammonium is unlikely to pose a carcinogenic risk.

Reproductive and developmental toxicity

In a developmental study in rabbits, the NOAEL for maternal toxicity was 1.25 mg/kg bw/d, based on deaths, reduced feed consumption, increased kidney weight or an increased number of abortions 2.5 mg/kg bw/d. Similarly, the NOAEL for foetal toxicity was 1.25 mg/kg bw/d, based on a dose-related increase in post-implantation losses and a dose-related reduction in the number of live foetuses from 2.5 mg/kg bw/d. Glufosinate-P-ammonium did not induce any embryotoxic or teratogenic effects in rats up to and including 125 mg/kg bw/d. Findings were consistent with studies in rats and rabbits on the racemate. Glufosinate-P-ammonium is not classified as a developmental toxicant.

In a one-generation reproductive study with glufosinate-P-ammonium in rats, the NOAEL for parental toxicity was 1000 ppm (88 mg/kg bw/d), the highest tested dose with an absence of any systemic findings. The reproductive LOAEL was 1000 ppm based on increased gestation length and increased pre-and post-implantation loss. The offspring NOAEL was 180 ppm (15.5 mg/kg bw/d) based on a reduction in pup viability at 1000 ppm. In a two-generation study of reproductive toxicity in rats with the racemate, the overall NOAEL for parental toxicity was 500 ppm (equal to 44 mg/kg bw/d). The overall NOAEL for reproductive toxicity was 120 ppm (equal to 8.7 mg/kg bw/day), based on reduced litter sizes in all litters at 360 ppm (equal to 18 mg/kg bw/d). Glufosinate-P-ammonium is classified as a reproductive toxicant.

The essential role of GS in implantation of mouse embryos has been recognised in *in vitro* and *in vivo* studies. In submitted studies on reproduction in rats, daily exposure to glufosinate ammonium had no detectable effect on the earliest stages of the reproductive sequence including gametogenesis, ovulation, mating and conception. However, glufosinate ammonium did interfere with rat gestation before and at the stage of blastocyst implantation into the uterus, resulting in overall litter loss. After implantation, no further effects were observed on prenatal and post-natal development.

Neurotoxicity

No additional data was provided for glufosinate-P-ammonium. In an acute gavage study on glufosinate ammonium neurotoxicity in rats, the NOAEL was 100 mg/kg bw, based on clinical signs at 500 mg/kg bw, a dose that produced ptosis, tachypnoea, hunched posture, and piloerection in functional observation battery (FOB) tests.

In a dietary 38-day neurotoxicity study in rats and a 90-day dietary study investigating brain and liver GS inhibition in rats, the overall NOAEL was 6.2 mg/kg bw/d, based on a greater than 50% reduction in GS activity in the liver in males 15 mg/kg bw/day. In a 28-day dietary range-finding and two 13-week dietary studies in rats, the overall NOAEL was 263 mg/kg bw/day, based on neurological effects in both sexes. GS activity was not measured in these studies.

In a dietary developmental neurotoxicity study in rats, the NOAEL for maternal toxicity was 69 mg/kg bw/d, based on decreased body weight gain and feed consumption at 292 mg/kg bw/d. The NOAEL for offspring toxicity was 14 mg/kg bw/d, based on reduced body weight gain during the preweaning period, effects on motor activity at postnatal days 17, 21 and 62, and hippocampal pathology in males at 69 mg/kg bw/d.

Dogs appear to be the most sensitive species to the neurotoxic effects of glufosinate ammonium. Convulsions followed by death, were observed at a dietary concentration equal to a dose of 10-16 mg/kg bw/d after 10-14 days exposure. A 28-day dog study showed significant changes in a range of brain biogenic amines associated with decreased glutamine synthetase (GS) activity, with abnormal gait following administration of glufosinate ammonium at 8 mg/kg bw/d. Mechanistic evidence reviewed by JMPR in 2012, indicated that a statistically significant inhibition of GS activity in the brain of more than 10% should be considered to be an adverse effect on brain biochemistry and animal behaviour. Based on this criterion, the APVMA ADI and ARfD for glufosinate-ammonium were both revised downwards to 0.01 mg/kg bw/d in 2024.

Mode of action (toxicology)

The following adverse outcome pathway (AOP) for the critical effect (neurotoxicity) caused by glufosinate ammonium in mammals has been postulated:

Molecular initiating event: Glutamine synthetase (GS) binding

Key events: Glutamine reduction / effects on GABA-glutamate shunt / activation of N-methyl-D-aspartate (NMDA) / increased intracellular ammonium

Adverse outcomes: Impaired brain biochemistry (excitatory and inhibitory neurotransmission) / behavioural effects / cytotoxicity (neuroinflammation/neurodegeneration)

Toxicity of metabolites and/or impurities

The main metabolites of glufosinate-P-ammonium are methyl-phosphinico-propionic acid (MPP) and 2-methylphosphinico-acetic acid (MPA). N-acetylglufosinate (NAG) is only found in crop residues.

The acute oral toxicity of MPP is low in rats. MPP is not a skin sensitiser in guinea pigs (GPMT).

In a short-term study with MPP in rats, GS activity in liver was not affected at doses up to 554 mg/kg bw/d. In sub-chronic dietary studies in rats (up to 546 mg/kg bw/d) and dogs (up to 103 mg/kg bw/d), no toxicity was observed. No evidence for genotoxicity was observed for MPP in a limited range of studies *in vitro*.

In a developmental toxicity study in rats, the NOAEL for maternal toxicity was 300 mg/kg bw/d, on the basis of one death out of 20 animals, clinical signs of toxicity and reduced body weight gain and feed consumption observed at 900 mg/kg bw/d. The NOAEL for foetal toxicity was 300 mg/kg bw/d, on the basis of 3 dams out of 20 with total litter loss at 900 mg/kg bw/d. In a developmental toxicity study in rabbits, the NOAEL for maternal toxicity was 50 mg/kg bw/d, on the basis of one death out of 15 animals, one abortion, clinical signs of toxicity and reduced body weight gain and feed consumption observed at 100 mg/kg bw/d. The NOAEL for foetal toxicity was 50 mg/kg bw/d, on the basis of one dam with seven conceptuses undergoing resorption at 100 mg/kg bw/d. Based on these results, MPP is not considered to be teratogenic.

The acute oral toxicity of MPA in rats was low. In a 90-day dietary study in rats, the NOAEL was 684 mg/kg bw/d, the highest dose tested. GS activity was not measured, but in view of the structural similarity between MPA and MPP, it seems unlikely that MPA would inhibit this enzyme. MPA was not genotoxic in genotoxicity tests *in vitro.*

The oral acute toxicity of NAG is low in rats and mice. NAG is not a skin sensitiser in guinea pigs (GPMT). In a rat neurotoxicity study, no effects on GS and neurotoxicity parameters were observed at doses up to 159 mg/kg bw/d, the highest dose tested. In a 13-week dietary study in dogs, the NOAEL was 20 mg/kg bw/d, based on a reduction in brain GS activity (≥ 16%) at 76 mg/kg bw/day. NAG has previously been shown to be non-genotoxic with no evidence of carcinogenicity in rats and mice. NAG is neither a reproductive nor developmental toxicant.

Reports related to human toxicity

Although a number of reports on human poisoning from intentional ingestion of glufosinate ammonium appear in the literature, no reports on adverse effects related to incidental exposure were found in a PubMed literature search. No reports were available on levels of GS activity following poisoning cases. The results of an *in silico* PBPK modelling study concluded that C_{max} and AUC values for glufosinate ammonium in the dog brain was significantly higher than in rats and humans (dosed 5-100 mg/kg bw/d), indicating dogs may be more sensitive to the effects from glufosinate ammonium than humans.

Poisons Standard

Glufosinate ammonium, which captures glufosinate-P-ammonium, is listed in Schedule 5 of the SUSMP with no exemption (Health 2025). None of the excipients in Basta Ultra Herbicide and Liberty Ultra Herbicide are scheduled. As Schedule 5 poisons, both products require a CAUTION signal header on their labels.

Health-based guidance values

Acceptable daily intake

The acceptable daily intake (ADI) for glufosinate ammonium (all isomers) is 0.01 mg/kg bw/d based, on a No Observed Adverse Effect Level (NOAEL) of 1 mg/kg bw/d in a 28-day capsule study in dogs, based on an increase in spontaneous motor activity, together with a >10% reduction in glutamine synthetase (GS) activity in the brain at the next higher dose. This is supported by a 90-day dietary study in dogs with glufosinate-P-ammonium that measured GS and had a LOAEL of 2 mg/kg bw/d (lowest tested dose) and a developmental study in rabbits, where deaths, increased kidney weight and an increased number of abortions were observed in the absence of GS monitoring at 2.5 mg/kg/bw/d (NOAEL of 1.25 mg/kg/bw/d). The ADI includes two metabolites, N-acetyl-glufosinate (NAG), and methyl-phosphinico-propionic acid (MPP).

Acute reference dose

The acute reference dose (ARfD) for glufosinate ammonium (all isomers) is 0.01 mg/kg bw/d, based on a No Observed Adverse Effect Level (NOAEL) of 1 mg/kg bw/d in a 28-day capsule study in dogs based on an increase in spontaneous motor activity, together with a >10% reduction in glutamine synthetase (GS) activity in the brain at the next higher dose. This is supported by a 90-day dietary study in dogs with glufosinate-P-ammonium that measured GS and had a LOAEL of 2 mg/kg bw/d (lowest tested dose). GS inhibition occurred after a single exposure.

Recommendations

The APVMA has evaluated the toxicology of the new active constituent glufosinate-P-ammonium and associated products Basta Ultra Herbicide and Liberty Ultra Herbicide, including acute and repeat dose toxicity and current health-based guidance values. After consideration of the toxicological profile and likely human exposure associated with the use of Basta Ultra Herbicide and Liberty Ultra Herbicide, the APVMA concludes that the human health risk is acceptable according to the criteria stipulated in Section 5A of the Agricultural and Veterinary Chemicals Code Act (1994) for all proposed application methods, when used in accordance with the directions for use (DFU) and adhering to the recommended first aid instructions and safety directions and restraints/restrictions (Refer to *Work health and safety and public health assessment*).

Residues assessment

The applicant has submitted residue trial data, analytical methodology, fate in storage and processing data, and residues in trade information in support of the proposed products.

The proposed use of Basta Ultra Herbicide is largely in the same situations as currently registered for Basta Non-Selective Herbicide (P39118), excluding the summer fallow situations (the fallow use pattern has been applied for under Liberty Ultra Herbicide). Application rates target approximately 60% of the current registered rate for the racemic mixture of the 2 stereoisomers. A new use in coffee is also proposed on the label under the 'plantations, vineyards and other row crops' section. Basta Ultra Herbicide is the same formulation type as Basta Non-Selective Herbicide (SL) but contains only the active L-isomer of glufosinate instead of a racemic mixture.

The proposed use pattern for Liberty Ultra Herbicide on LibertyLink Canola largely replicates that of Liberty Herbicide (P53595), with the application rate adjusted to approximately 60% active ingredient applied on an ai/ha basis as compared to Liberty Herbicide to account for only the active isomer of glufosinate being applied. The applicant proposes to set a grazing withholding period (WHP) at 6 weeks for canola (compared to 10 weeks on Liberty Herbicide) and remove the current grazing restriction that relates to dairy animals producing milk for human consumption. Label instructions are proposed to prevent canola grown for seed production (for re-planting) from being grazed. For the fallow use pattern, a minimum 1-day re-planting interval has been proposed (rather than the 14 days currently registered for Basta Non-Selective Herbicide, P39118). In conjunction with the new fallow use, BASF also propose a new use for Optical Spot Spray Technologies (OSST).

Metabolism

The metabolism of glufosinate (mixture of isomers) in plants and animals has been previously evaluated. No additional metabolism studies were submitted with the current application, and no further consideration of glufosinate metabolism is required.

Analytical methods and storage stability

Plant commodities

In the Australian residue trials provided in support of the application, glufosinate-ammonium and its metabolite residues were extracted with water with the addition of methanol and dichloromethane in some cases. For 3-[hydroxy(methyl)-phosphinoyl] propionic acid (MPP) and N-acetyl glufosinate (NAG), the filtered extract was analysed by liquid chromatography coupled with a tandem mass spectrometer (LC/MS/MS), using external matrix standards. For glufosinate-ammonium residues, the filtered extract was derivatised, using 9-flurenylmethyl-chloroformate (FMOC) in borate buffer, before analysis by LC/MS/MS, using external matrix standards. In some cases, glufosinate could be quantified without derivatisation.

The Limit of Quantitation (LOQ) was generally 0.01 mg/kg for glufosinate ammonium and each of its metabolites. The Limit of Detection (LOD) was generally 0.003 mg/kg for each analyte. For the canola study, LOQs ranged from 0.1 to 0.5 mg/kg. Recoveries from fortified control samples were generally within acceptable limits.

In overseas coffee trials, total glufosinate residues were extracted from coffee green beans with water. Isotopically labelled internal standards were added and the extract purified through a strong anion exchange (SAX) column. Analysis was by LC/MS/MS. The LOQ was 0.01 mg/kg for each analyte. Similar procedures were used in a coffee bean processing study.

Recoveries from fortified control samples of coffee green beans, roasted coffee beans and instant coffee were within acceptable limits.

Animal commodities

In the NAG dairy cattle transfer study provided with this submission, tissue and milk samples were analysed for glufosinate ammonium (GA), 3-methyl-phosphinico-propinoic acid (MPP), and N-acetyl-glufosinate (NAG) by high performance liquid chromatography-electrospray ionization / tandem mass spectrometry (HPLC-MS/MS) using isotopically labelled internal standards. For extraction the methods used a mixture of ethanol/water for MPP and NAG or just water for GA. The LOQ was 0.01 mg/kg for each analyte. Concurrent recoveries were generally within acceptable limits when the appropriate extraction solvent was used.

Storage stability

The applicant has provided a new storage stability study showing that L-Glufosinate and D-Glufosinate were stable (< 30% decomposition) in all crop matrices tested during ~37 months of frozen storage at <-20°C. The plant matrices tested were grape (high acid content representative), corn forage (high water content representative), corn grain (high starch content representative), dry bean seed (high protein content representative), cotton seed and soybean seed (high oil content representatives).

Storage stability of residues racemic glufosinate and its metabolites has been demonstrated to be satisfactory in previous evaluations. The 2012 JMPR concluded that glufosinate, NAG and MPP residues are stable for at least 24 months in tolerant sugar beet roots and tops and for at least 9 months in sugar beet processed fractions, for at least 24 months in soya bean seed and hay and at least 12 months for soya bean processed fractions, at least 23 months for rape seed, at least 24 months in maize forage and grain and at least 12 months in maize processed fractions, at least 26 months for sweet corn forage, at least 30 months for sweet corn ears, and at least 12 months for rice grain.

In the new residue trials submitted, all samples were maintained under freezer conditions, (i.e.–18°C) prior to analysis and tested within 31 months of collection. This is acceptable for the purposes of the current application, noting also that the submitted residue trials were mostly side by side bridging trials comparing the proposed product with a racemic product, so any effects of storage on residues should be the same within each trial.

Residue definition

No changes to the components in the residue definition for glufosinate are required, noting also it would not be appropriate to change the residue definition while racemic products are still registered. However, a change has been proposed to the expression of the residue definition to bring it into line with that in the European Union (EU) which covers the same components but is more explicit. The recommended definition is:

Sum of glufosinate isomers, their salts and metabolites 3-[hydroxy(methyl)phosphinoyl]propionic acid (MPP) and N-acetyl-glufosinate (NAG), expressed as glufosinate

It is also recommended that the MRL Standard listing for the active should be changed to "*Glufosinate, Glufosinate-ammonium and Glufosinate-P-ammonium*" in Tables 1, 3 and 4.

Residues in food and animal feeds

Basta Ultra Herbicide - Coffee

For the new use on coffee the proposed application rate is up to 591 g ai/ha as a directed or shielded spray. A harvest withholding period for coffee has not been specified on the label but would assume the intention is "Not required when used as directed" as for the other commodities with this use pattern. The proposed grazing withholding period is 8 weeks as for "all other crops".

The applicant has provided full details of an overseas Good Laboratory Practice (GLP) residue study on coffee.

Ten field residue trials (6 harvest and 4 decline trials) were conducted to measure the magnitude of glufosinate (the free acid form of glufosinate-ammonium) residues in/on coffee following ground directed spray applications of glufosinate-ammonium.

Twenty days after application at 0.59 to 0.62 kg glufosinate-ammonium/ha (approximately the proposed rate for the active isomer only) total glufosinate residues in coffee beans were <0.03 mg/kg (n = 5). The highest total glufosinate residue in coffee beans after 3 applications each at 0.44 to 0.46 kg glufosinate-ammonium/ha (0.74 – 0.76× proposed rate for the active isomer only) for a total seasonal application rate from 1.3 to 1.4 kg glufosinate-ammonium/ha) was 0.054 mg/kg.

Given the proposed use pattern is for a directed or shielded spray the residue potential for coffee beans should be low. However, the available coffee trials suggest there is some potential for low residues in coffee beans in some instances. While the trials do not closely reflect the proposed GAP in terms of the application rate of the active isomer, it is considered that a Maximum Residue Limit (MRL) of 0.1 mg/kg for glufosinate on coffee beans should be appropriately conservative to cover the proposed use. This should replace the current MRL of T*0.05 mg/kg for SB 0716 Coffee beans to cover the use allowed under permit. The supported harvest withholding period is "Not required when used as directed".

Other uses of Basta Ultra Herbicide

The other proposed uses of glufosinate-P-ammonium are in the same situations as currently registered for Basta Non-Selective Herbicide (P39118), excluding the summer fallow situations. Application rates target 60% of the current registered rate for the racemic mixture of the 2 stereoisomers, therefore MRLs are expected to remain appropriate. To confirm this is the case a series of bridging residue trials comparing the proposed glufosinate-P-ammonium product with the registered glufosinate-ammonium product have been provided.

Given the use pattern as a directed or shielded spray, the residue potential should be low. While there were some low detections in the trials, residues were generally below quantifiable limits. For the samples with low detections

there was no significant difference for those from the glufosinate-P-ammonium product compared to those from the glufosinate-ammonium product.

Tropical and sub-tropical fruit

All total residues for both treatments were below the current MRL of 0.2 mg/kg for glufosinate on FI 0030 Assorted tropical and sub-tropical fruits – inedible peel, even the HR of 0.14 mg/kg which was in a contaminated untreated lychee control sample.

Citrus, pome fruit, stone fruit, olives, tree nuts

All total residues for both treatments were below current MRLs at 0.1 mg/kg for FC 0001 Citrus fruits, *0.1 mg/kg for FP 0009 Pome fruits, *0.05 mg/kg for FS 0012 Stone fruits, *0.1 mg/kg for FT 0305 Olives and 0.1 mg/kg for TN 0085 Tree nuts.

Berries and other small fruit

All total residues for both treatments were below the current MRL of 0.1 mg/kg for FB 0018 Berries and other small fruits.

Sugarcane

Residues in sugarcane stems (billets) and foliage (tops) were all below quantifiable limits for both treatments which is as expected for a directed or shielded spray in conjunction with a 16 week harvest and grazing withholding period. Current MRLs of *0.2 mg/kg for GS 0659 Sugar cane, *0.2 mg/kg for AM 0659 Sugar cane fodder and *0.2 mg/kg for AV 0659 Sugarcane forage should remain appropriate for the proposed use.

Uses of Liberty Ultra Herbicide

Canola

The maximum rate for canola will be for canola for seed production, i.e. seed for re-planting only so will not enter the food chain. In addition, the following grazing restraint has been proposed for canola grown for seed production: “DO NOT graze or cut for stock feed”.

The critical GAP for canola will therefore be for 2 applications each at 337.6 g ai/ha applied with a 7 – 14 day re-treatment interval from the 2-leaf stage to early bolting (BBCH 12 to BBCH 33). The proposed harvest withholding period is “Not required when used as directed”. The proposed grazing withholding period is 6 weeks (compared to 10 weeks on the label for Liberty Herbicide which also has a grazing restraint for livestock producing milk for human consumption). It is noted that the critical GAP on the label for Liberty Herbicide is for 2 applications at 600 g ai/ha. The proposed use of glufosinate-P-ammonium is therefore 0.56× the registered rate for total glufosinate for the racemic product.

Total glufosinate residues in canola forage at 6 weeks (or more if residues increased) after 1-2 applications of glufosinate-P-ammonium targeted to 337.6 g ai/ha made between BBCH 16 – 33 were 2.27, 3.97, 4.19, 5.39, 5.91, 5.92 and 8.79 mg/kg on a dry weight basis. The Organisation for Economic Cooperation and Development (OECD) MRL Calculator recommends an MRL of 20 mg/kg (Supervised Trial Median Residue STMR = 5.39

mg/kg, n = 7). No changes are required to the current MRL of 40 mg/kg for glufosinate and glufosinate ammonium on Rape seed [canola] forage and fodder to cover the proposed use of glufosinate-P-ammonium in conjunction with a 6-week grazing withholding period.

Total glufosinate residues in canola grain at harvest after 1-2 applications of glufosinate-P-ammonium targeted to 337.6 g ai/ha made between BBCH 16 – 33 were <LOD (5) and <LOQ (2) mg/kg (Total LOD = 0.165 mg/kg, Total LOQ = 0.373 mg/kg). No changes are required to the current MRL of 0.5 mg/kg for glufosinate and glufosinate ammonium on SO 0495 Rape seed [canola] to cover the proposed use of glufosinate-P-ammonium in conjunction with a harvest withholding period of “Not required when used as directed”.

Total glufosinate residues in canola straw at harvest after 1-2 applications of glufosinate-P-ammonium targeted to 337.6 g ai/ha made between BBCH 16 – 33 were <LOD (0.451), 1.10, 1.39, 3.02, 3.90, 4.17 and 4.53 mg/kg on a dry weight basis. The OECD MRL Calculator recommends an MRL of 10 mg/kg (STMR = 3.02 mg/kg, n = 7). No changes are required to the current MRL of 40 mg/kg for glufosinate and glufosinate ammonium on Rape seed [canola] forage and fodder to cover the proposed use of glufosinate-P-ammonium in conjunction with a harvest withholding period of “Not required when used as directed”.

Fallow

Basta Non-Selective Herbicide (product no. 39118) is currently registered for summer fallow weed control prior to planting cereals, pulses and oilseeds. Up to 3 applications are permitted at 3.75 L/ ha (750 g ai/ha) in a minimum of 100 L water, with a minimum replant interval of 14 days (the applicant indicates that this re-plant interval was added for efficacy reasons only).

The proposed use of glufosinate-P-ammonium on summer fallow is for application at 422 g ai/ha (0.56× registered rate for the racemic mixture) in a minimum of 100 L water. However, a 1-day minimum replant interval has been proposed.

For both Basta and the proposed product the harvest withholding period is “Not required when used as directed”, the grazing withholding period is 6 weeks after sowing.

The applicant has provided a bridging residue study conducted on chickpea and sorghum grown after a fallow treatment.

Total residues in grain were not detectable for both treatments for both chickpea and sorghum, while for straw the total residues were all below the combined LOQ. For chickpea forage the combined total residue at 6 weeks after sowing was slightly higher for the glufosinate-P-ammonium product compared to the racemic mixture (0.55 mg/kg compared to 0.52 mg/kg), with the opposite result at 4 weeks (0.30 mg/kg compared to 0.42 mg/kg). For sorghum forage all results for both products were below the combined LOQ.

The limited bridging dataset do not appear to suggest there will be any greater residue potential for the proposed product compared to the registered racemic product noting also that the rate of total glufosinate will be reduced by 0.56× for the proposed product.

In support of the proposed reduction in the re-planting interval from 14 days to 1 day the applicant has re-submitted some of the original residue studies considered when the fallow use was first supported. These studies include re-planting intervals from 0 days.

In the Australian trials in barley, maize, soya bean, mung bean and chickpea, which were conducted in accordance with the proposed GAP, residues of parent, NAG and MPP were below the LOQ (0.10 mg/kg for each analyte) in all forage, straw, stubble, grain and seed samples, with the exception of a single soya bean stubble sample containing a low level of MPP (0.14 mg/kg).

As this data was considered previously when current MRLs for cereals, pulses and oilseeds were established, the proposal to reduce the re-plant interval to 1-day is acceptable from a Residue and Trade perspective.

Fallow pasture grazing

The applicant has proposed an 8-week grazing withholding period for grazing on treated fallow. This is the same as currently on the label for Basta Non-Selective Herbicide (P39118). Noting the lower residue potential for the proposed product which will be applied at 0.56× the registered rate for total glufosinate for the racemic product and the bridging residue data provided by BASF for this product and for Basta Ultra Herbicide showing the total residue potential should not increase the proposed 8 week grazing withholding period is acceptable.

Optical spot spray technologies in fallow

In conjunction with the new fallow use for Liberty Ultra Herbicide, it is proposed to also include an additional use (in fallow) using Optical Spot Spray Technologies (OSST). OSST is a precision spray technology that allows for the targeted control of weeds in fallow situations thereby significantly reducing the overall quantity of herbicide that needs to be applied. The proposed use would permit the use of a higher concentration spray for target weed control (5.4 L/100L water); however, this would also include the label instructions to (i): Calibrate the sprayer to spray the equivalent of 100 L/ha and (ii) not apply greater than 37 L of spray mixture per hectare through OSST equipment (which equates to 2 L of product per hectare). As such, the maximum application rate on a per hectare basis is identical for all fallow uses.

The proposed treatment of fallow by optical spot spray technologies should not result in a greater overall residue potential than the conventional fallow treatment considered above.

Crop rotation

The potential for residues in rotational crops is less than currently exists noting the lower overall residue potential for the proposed product compared to the currently registered uses of racemic products.

Residues in animal commodities

As a worst case it will be assumed that canola forage can form 100% of the diet for both beef and dairy cattle to give a maximum dietary exposure of 8.8 ppm for this product containing only the active isomer. It is noted that the highest Table 4 entry for glufosinate and glufosinate-ammonium is 40 mg/kg for Rape seed [canola] forage and fodder to cover residues from the racemic product Liberty Herbicide which has a grazing restraint for livestock producing milk for human consumption.

The applicant has provided full details of a dairy cattle transfer study involving dosing with N-acetyl glufosinate. A previously submitted study involving dosing with a mixture of glufosinate ammonium and N-acetyl-glufosinate was also considered.

The dietary burden for beef cattle should not increase compared to that for current registrations, noting the lower residue potential compared to that for racemic products. The removal of the grazing restraint for dairy cattle for this product requires further consideration as below. It is noted that MPP residues in canola forage in the relevant residue trials were <LOD, while NAG is specific to genetically modified glufosinate-tolerant crops and represents the major portion of the residue in these crops.

Dairy Cattle

Feeding level (compounds) (ppm)	Milk	Muscle	Liver	Kidney	Fat
	Total glufosinate residue (mg/kg)				
9.1 (GA + NAG)	<0.02	<0.05	<0.10	<0.10	<0.05
27.3 (GA + NAG)	0.024	<0.05	<0.10	<0.10	<0.05
9.0 (NAG)	<0.03	<0.03	0.035	0.051	<0.03
8.8 – dairy, estimated burden	<0.03	<0.05	<0.10	<0.10	<0.05
Established MRLs	*0.05 (milks)	0.1 (meat)	5 (offal)		0.1 (meat)
Recommended MRLs	No change	No change	No change		No change

The removal of the grazing restraint for dairy cattle is supported for the proposed product with no changes required to the current MRL of *0.05 mg/kg for glufosinate and glufosinate ammonium in milk.

Poultry

No changes have been proposed to the MRLs for glufosinate and glufosinate ammonium on canola grain and meal, or for other grain crops. The maximum livestock dietary burden for poultry should remain unchanged and current poultry commodity MRLs should remain appropriate, noting the lower overall residue potential for the proposed product compared to registered racemic products.

Dietary risk assessment

The chronic dietary exposure to glufosinate-ammonium is estimated by the National Estimated Daily Intake (NEDI) calculation encompassing all registered/temporary uses of the chemical and the mean daily dietary consumption data derived primarily from the 2011-12 National Nutritional and Physical Activity Survey. The NEDI calculation is made in accordance with WHO Guidelines and is a conservative estimate of dietary exposure to chemical residues in food. The NEDI for glufosinate-ammonium is equivalent to <30% of the ADI. It is concluded that the chronic dietary exposure to glufosinate-ammonium is acceptable.

The acute dietary exposure is estimated by the National Estimated Short Term Intake (NESTI) calculation. The NESTI calculations are made in accordance with the deterministic method used by the JMPR with 97.5th percentile food consumption data derived primarily from the 2011-12 National Nutritional and Physical Activity Survey. NESTI calculations are conservative estimates of short-term exposure (24 hour period) to

chemical residues in food. The highest acute dietary intake was estimated at 41% of the ARfD. It is concluded that the acute dietary exposure is acceptable.

Recommendations

The following amendments are required to be made to the APVMA MRL Standard (Table n).

Table n: Amendments to the APVMA MRL Standard

Amendments to Table 1		
Compound	**Food**	**MRL (mg/kg)**
Delete:		
Glufosinate and Glufosinate ammonium		
Add:		
Glufosinate, Glufosinate ammonium and Glufosinate-P-ammonium		
Glufosinate, Glufosinate ammonium and Glufosinate-P-ammonium		
Delete:		
SB 0716	Coffee beans	T*0.05
Add:		
SB 0716	Coffee beans	0.1
Amendments to Table 3		
Compound	**Residue**	
Delete:		
Glufosinate and Glufosinate ammonium	Sum of glufosinate-ammonium, N-acetyl glufosinate and 3-[hydroxy(methyl)-phosphinoyl] propionic acid, expressed as glufosinate (free acid)	
Add:		
Glufosinate, Glufosinate ammonium and Glufosinate-P-ammonium	Sum of glufosinate isomers, their salts and metabolites 3-[hydroxy(methyl)phosphinoyl]propionic acid (MPP) and N-acetyl-glufosinate (NAG), expressed as glufosinate	

Amendments to Table 4		
Compound	**Animal feed commodity**	**MRL (mg/kg)**
Delete		
Glufosinate and Glufosinate ammonium		
Add:		
Glufosinate, Glufosinate ammonium and Glufosinate-P-ammonium		

Note: No MRL changes are proposed (except for coffee beans), just changes to the listing of the active to include glufosinate-P-ammonium.

Assessment of overseas trade aspects of residues in food

No changes are required to the current glufosinate MRLs apart from the MRL proposed for coffee which is not a major export commodity. The risk to trade is less than currently exists noting the overall lower residue potential for the proposed product compared to the currently registered uses of racemic products. While the grazing restraint for cattle producing milk for human consumption that is on the racemic product has been removed for the proposed product, quantifiable residues are still not expected to occur in milk. The risk to trade is expected to be low.

Work health and safety and public health assessment

Basta Ultra Herbicide is intended for use as an herbicide for the control of certain broadleaf and grass weeds in a variety of crops and non-crop situations. The product is intended for professional use and will be applied mechanically by ground boom or manually by handgun, knapsack or hand wand spray equipment. Controlled droplet application (CDA) equipment may also be used.

Liberty Ultra Herbicide is intended for use as a herbicide for the control of certain broadleaf and grass weeds in canola varieties (with tolerance to Liberty Ultra Herbicide) and for maintenance of summer fallow prior to planting of a range of broadacre crops. The product is intended for professional use and will be applied mechanically by ground boom, which may include the use of optical spot spray technologies (OSST).

Health hazards

Basta Ultra Herbicide and Liberty Ultra Herbicide have very low toxicity by the oral route, low toxicity by the dermal and inhalation routes, are severely irritating to the eyes and have moderate skin irritation potential but are not skin sensitisers in the mouse LLNA test.

The main hazard from repeated exposure to glufosinate ammonium is potential neurotoxicity.

Occupational exposure

Exposure during use

Workers may be exposed to the product from dermal and/or inhalation routes during mixing, loading and application (M/L/A) and dermal exposure during post-application activities. Minor or accidental ocular exposure may also occur.

APVMA used the US EPA Occupational Pesticide Handlers Exposure Calculator (OPHEC, 2021) to estimate worker exposure during M/L/A of Basta Ultra Herbicide and Liberty Ultra Herbicide. Repeat exposure risks for both products were acceptable (MOE >100) for all application methods when workers wear single layer clothing and gloves. PPE recommended for acute hazards are a hat and goggles. The US EPA OPHEC exposure estimates for all label methods of application, without the use of any PPE, were below the ARfD, and health risks from ‘single’ (acute) exposure, were considered negligible.

Exposure during re-entry

Workers performing post-application activities in various crop types may be exposed to Basta Ultra Herbicide and Liberty Ultra Herbicide residues from dermal contact with foliage. Exposure risk for workers undertaking activities associated with maintenance was estimated using the US EPA Occupational Re-Entry Exposure Calculator (OPREC, 2021).

For Basta Ultra Herbicide, risks for all post application maintenance activities in label crops and other situations were acceptable (MOEs >100) on the day of application. Similarly, risks for relevant maintenance activities in canola treated with Liberty Ultra Herbicide were also acceptable on the day of application.

As there are acute dermal hazards (moderate skin irritation) associated with the product residues, a standard re-entry statement is required on the labels.

Public exposure

Application of Basta Ultra Herbicide and Liberty Ultra Herbicide by mechanical ground boom may lead to unintended bystander exposure via chemical spray drift. Risks to bystanders from spraying activities were estimated using the APVMA Spray Drift Risk Assessment Tool (2023). Results indicated that no buffer zones are required when spraying either product at the maximum application rate using a MEDIUM droplet size.

Exposure to glufosinate-P-ammonium residues is possible from ingestion of residues in treated crops. APVMA Residues establishes maximum residue limits (MRLs) in food crops to ensure the ADI and ARfD are not exceeded.

Basta Ultra Herbicide will be used for line-marking on sports grounds. The public may therefore be exposed to product residues in treated turf areas. Post application exposure risks were undertaken by the APVMA using the US EPA Standard Operating Procedures for Residential Pesticide Exposure Assessment - Lawns/Turf SOP (US EPA 2012). Estimates of risks from high contact lawn activities for adults and toddlers (assumed to be the sub-population at highest risk) provided acceptable MOEs (>100) for all exposure scenarios. Therefore, no specific risk mitigation measures are required, other than the recommended standard re-entry statement (see below).

Recommendations

The following first aid instructions, safety directions and precautionary statements are recommended for the product label.

First aid instructions

If poisoning occurs, contact a doctor or Poisons Information Centre. Phone Australia 131126; New Zealand 0800 764 766.

Safety directions

Will damage the eyes. Will irritate the skin. Avoid contact with eyes and skin. If product in eyes, wash it out immediately with water. If product on skin, immediately wash area with soap and water. When using together with other products, consult their label safety directions. When opening the container and preparing spray and using the prepared spray, wear cotton overalls buttoned to the neck and wrist (or equivalent clothing) and a washable hat, elbow length chemical resistant gloves and goggles. Wash hands after use. After each day's use, wash gloves, goggles and contaminated clothing.

Precautionary statements/restraints and restrictions

DO NOT allow bystanders to come into contact with the spray cloud.

DO NOT apply by a boom sprayer unless the following requirements are met:

- spray droplets not smaller than a MEDIUM spray droplet size category.

DO NOT apply by aircraft.

DO NOT apply by mister. [Liberty Ultra only].

DO NOT apply greater than 37 L of spray mixture per hectare through OSST equipment (2 L of product per hectare). [Liberty Ultra only].

DO NOT enter or allow entry into treated areas until spray has dried. If prior entry is necessary, wear cotton overalls buttoned to the neck and wrist (or equivalent clothing) and chemical resistant gloves. Clothing must be laundered after each day's use.

Environmental assessment

Fate and behaviour in the environment

An aerobic soil metabolism study on glufosinate-p-ammonium was submitted which demonstrated its biodegradation rate and degradation pathway are similar to racemic glufosinate-ammonium. Therefore, fate and behaviour data on the racemate could be read-across to glufosinate-p-ammonium. In addition, to update the Australian data holdings on the racemate, 24 new studies on its fate and behaviour and five new studies on its methods of analysis in environmental media were supplied.

The degradation of glufosinate-ammonium was shown to be microbially-mediated, with initial attack at the amino terminus of the molecule rather than at the C-P bond. Glufosinate-ammonium is non-persistent in soil (geomean field DT_{50} 12 days) and is moderately mobile (geomean Kfoc 78 mL/g). Its mobility in soil does not correlate with organic matter but was shown to be influenced by the clay content of the soil. Glufosinate-ammonium is also non-persistent in aquatic systems (geomean DT_{50} 4.0 days) and largely remains in the water phase (max 3.8% in sediment). Glufosinate-ammonium is not volatile and is not expected to be subject to long-range transport through the air.

Effects and associated risks to non-target species

Thirty-two (32) studies on the toxicity of glufosinate-p-ammonium to non-target species were submitted. In addition, to update the Australian data holdings on the racemate, 21 new studies on its effects on non-target species were supplied. Data on chronic toxicity of glufosinate-p-ammonium to birds, fish, aquatic invertebrates and soil organisms were not available; however, acute studies on both glufosinate-p-ammonium and the racemate demonstrate similar toxicity. Based on these observations, chronic toxicity of glufosinate-p-ammonium is assumed to be similar to racemic glufosinate-ammonium.

Terrestrial vertebrates

Glufosinate-p-ammonium is considered to have moderate toxicity to mammals (geomean LD_{50} 858 mg ac/kg bw for racemate in two species) and birds (lowest LD_{50} 1297 mg ac/kg bw, *Coturnix japonica*). In a rabbit developmental toxicity study, maternal deaths, reduced feed intake, increased number of abortions, and dose-related increase in post-implantation losses were observed at doses as low as 2.5 mg ac/kg bw/d (NOAEL 1.3 mg ac/kg bw/d, *Oryctolagus cuniculus*). The rabbit endpoint is considered species-specific and is therefore relevant to assessment of lagomorphs only. In a one-generation reproductive toxicity study with rats, reduced pup viability, increased gestation duration and increased pre- and post-implantation loss were observed at 85 mg ac/kg bw/d (NOAEC 16 mg ac/kg bw/d, *Rattus norvegicus*). The rat endpoint is considered relevant to assessment of remaining wild mammal species. No adverse effects in birds were observed at the highest tested dietary concentration (NOEC 122 mg ac/kg bw/d for racemate in *Colinus virginianus*).

The acute assessment assumes 100% of food items are obtained from the treatment area on the last day of application, while the chronic assessment assumes 50% of food items are obtained from the treatment area for the first 21 day after the last application. A tiered approach was used beginning with assessment of an

indicator species that is protective of all food guilds, followed consideration of generic species protective of the specific food guilds, followed by consideration of an Australian focal species.

BASTA ULTRA HERBICIDE is sprayed along the sides of crops, between rows of crops, or directed to target weed avoiding contact with desirable vegetation. As such, most situations are considered a 'bare soil' scenario for the terrestrial vertebrate assessment. Fencelines in agricultural areas are expected to be grassy and therefore a 'grassland' scenario was considered appropriate. Orchards and vineyards often have vegetation interrow and are therefore assessed separately. The orchard scenario serves as a surrogate for banana, forestry/plantations, oil tea tree, date palms, and native foods. Acceptable risks could be concluded in all situations except to foliage-eating native rodents in orchards, banana, forestry/plantations, date palms, and native foods. An analysis to determine the acceptable GAP in these situations indicates one application at the maximum rate (2.8 L/ha), two applications up to 2.5 L/ha, and three applications up to 2.1 L/ha can be supported. Therefore, the following protection statement and restraints are advised.

> Moderately toxic to wild mammals. To protect native wildlife, DO NOT apply more than two applications up to 2.5 L/ha or more than three applications up to 2.1 L/ha in orchards, plantations, forestry plantations, date palms, native foods, or oil tea tree.

LIBERTY ULTRA HERBICIDE is applied to tolerant canola varieties from cotyledons fully expanded (2 leaf) to early bolting stage. Acceptable risks could be concluded to all non-target species that may be feeding within the crop at these times. Its use in summer fallow situations (including OSST application) was also determined to be acceptable. Therefore, no protection measures are considered necessary for terrestrial vertebrates.

Aquatic species

Glufosinate-p-ammonium has low toxicity to fish (LC_{50} >88 mg ac/L, four species), moderate toxicity to aquatic invertebrates (lowest LC_{50} 12 mg ac/L, *Mysidopsis bahia*) and aquatic plants (geomean E_rC_{50} 1.9 mg ac/L for racemate in *Lemna gibba*), and high toxicity to algae (lowest geomean E_rC_{50} 0.030 mg ac/L, *Anabaena flos-aquae*). The representative SL formulation was more toxic than the technical active constituent in both fish (LC_{50} 2.7 versus 303 mg ac/L, *Oncorhynchus mykiss*) and daphnids (EC_{50} 5.3 versus 328 mg ac/L, *Daphnia magna*), but approximately equivalent in the more sensitive mysid shrimp and cyanobacterium. The metabolites NAG, MPP, P-X, MPA, and MPF were less toxic than the parent substance to aquatic species. Based on the high toxicity to algae, the following hazard statement is triggered for glufonisate-p-ammonium product labels (followed by an appropriate risk mitigation statement).

> Very toxic to aquatic life.

Following long-term exposure to glufosinate-ammonium, reduced survival and growth of fish larvae was observed at concentrations as low as 51 mg ac/L (NOEC 26 mg ac/L, *Pimephales promelas*), and a biologically relevant reduction in aquatic invertebrate reproduction was observed at concentrations as low as 32 mg ac/L (NOEC 18 mg ac/L, *Daphnia magna*). Formulated (SL) glufosinate-ammonium was more toxic than technical substance to both fish (NOEC 0.092 versus 100 mg ac/L, *Oncorhynchus mykiss*) and aquatic invertebrates (NOEC 0.59 versus 18 mg ac/L, *Daphnia magna*).

A runoff assessment was conducted which considered the aquatic RAL of 8.7 µg ac/L (based on E_rC_{10} for *Anabaena flos-aquae*). The assessment followed a tiered process beginning with a worst-case Australian scenario (tier 1), followed by consideration spatial slope and soil characteristics in each of the growing regions (tier 2), followed by consideration of temporal rainfall and stream flow characteristics (tier 3). Crop groupings and runoff scenarios have been defined based on similarity in soil exposure and runoff behaviour rather than botanical classification. Because the assessment assumes a runoff event occurs three days after the last application, the following restraints are advised for both product labels.

> To protect aquatic species from runoff, DO NOT apply if heavy rains or storms are forecast within 3 days. DO NOT irrigate to the point of water runoff from the treatment area for at least 3 days after application.

Most situations progressed to the highest (tier 3) level of assessment. Acceptable runoff risks could be concluded in all situations except for the use of BASTA ULTRA HERBICIDE in forestry/plantations in Victoria in the summer months. However, when considering the restraint advised to mitigate risks to native rodents, runoff risks were concluded without the need for a timing restriction.

Bees and other non-target arthropods

Both glufosinate-p-ammonium and its representative SL formulation have low toxicity to bees by contact exposure (LD_{50} 31 to >300 µg ac/bee, *Apis mellifera*) and oral exposure (geomean LD_{50} 73 µg ac/bee, *Apis mellifera*). Following continuous dietary exposure to glufosinate-ammonium, mortality of adult bees was observed in a dose-dependent manner (LDD_{10} 22 µg ac/bee/d, *Apis mellifera*). Repeat dietary exposure to glufosinate-p-ammonium resulted in reduced larval emergence and D19 survival was observed at a dose of 25 µg ac/bee per developmental period (NOEL 13 µg/bee, *Apis mellifera*).

Risks to bees were determined to be acceptable under the worst-case scenario of a direct overspray of blooming plants. Therefore, no protection measures are considered necessary for bees.

The representative SL formulation was toxic at field relevant rates to the indicator species of predatory arthropods (LR_{50} 0.18 g ac/ha, T*yphlodromus pyri*) and parasitic arthropods (LR_{50} 0.18 g ac/ha, *Aphidius rhopalosiphi*) under laboratory conditions (i.e., contact exposure to fresh-dried residues on glass plates).

Based on the available data, acceptable risks to beneficial (predatory and parasitic) arthropods could not be concluded at the lowest proposed treatment rate (0.6 L/ha). Therefore, the following protection statement is advised for both product labels.

> Toxic to beneficial arthropods. Not compatible with integrated pest management (IPM) programs utilising beneficial arthropods. Minimise spray drift to reduce harmful effects on beneficial arthropods in non-crop areas.

Soil organisms

Both glufosinate-p-ammonium and its SL formulation have low toxicity to soil macro-organisms such as earthworms (LC50 >187 mg ac/kg dry soil, *Eisenia* spp.). The representative SL formulation also did not negatively affect soil processes such as nitrogen turnover at the highest tested concentration (6.7 mg ac/kg dry soil).

Risks to soil organisms were determined to be acceptable under the worst-case scenario of incorporation into the top 5-cm soil at the highest seasonal rate. Therefore, no protection measures are considered necessary for soil organisms.

Non-target terrestrial plants

The effects of an SL formulation containing 125 g/L glufosinate-p-ammonium was examined on ten species of non-target terrestrial plants. Following pre-emergent exposure (seedling emergence test), ER_{50} values were 342 g ac/ha in lettuce (*Lactuca sativa*), 921 g ac/ha in ryegrass (*Lolium multiflorum*), and >600 g ac/ha in the remaining tested species. Following post-emergent exposure (vegetative vigour test), ER_{50} values ranged 57 g ac/h in lettuce (*Lactuca sativa*) to 499 g ac/ha in onion (*Allium cepa*). An HR_5 value of 34 g ac/ha was derived based on a species sensitivity distribution (SSD) analysis of the post-emergent ER_{50} values for nine plant species. This value is used in the spray drift assessment.

Recommendations

Basta Ultra Herbicide

The following protection statements are recommended based on the outcome of the risk assessment.

> Moderately toxic to wild mammals. To protect native wildlife, DO NOT apply more than two applications up to 2.5 L/ha or more than three applications up to 2.1 L/ha in orchards, plantations, forestry plantations, date palms, native foods, or oil tea tree.
>
> Very toxic to aquatic life. DO NOT contaminate wetlands or watercourses with this product or used containers. To protect aquatic species from runoff, DO NOT apply if heavy rains or storms are forecast within 3 days. DO NOT irrigate to the point of water runoff from the treatment area for at least 3 days after application.
>
> Toxic to beneficial arthropods. Not compatible with integrated pest management (IPM) programs utilising beneficial arthropods. Minimise spray drift to reduce harmful effects on beneficial arthropods in non-crop areas.

Liberty Ultra Herbicide

The following protection statements are recommended based on the outcome of the risk assessment.

> Very toxic to aquatic life. DO NOT contaminate wetlands or watercourses with this product or used containers. To protect aquatic species from runoff, DO NOT apply if heavy rains or storms are forecast within 3 days. DO NOT irrigate to the point of water runoff from the treatment area for at least 3 days after application.
>
> Toxic to beneficial arthropods. Not compatible with integrated pest management (IPM) programs utilising beneficial arthropods. Minimise spray drift to reduce harmful effects on beneficial arthropods in non-crop areas.

Efficacy and safety assessment

Proposed product use pattern

Basta Ultra Herbicide: For non-residual control of broadleaf and grass weeds in various situations.

Liberty Ultra Herbicide: For non-residual control of certain broadleaf and grass weeds in LibertyLink® Canola varieties (with tolerance to Liberty® Ultra Herbicide), fallow and optical spot spray technologies (OSST).

Efficacy and target crop/animal safety

Efficacy

Basta Ultra Herbicide

Twenty-six replicated trials are provided in support of equivalence (efficacy and crop safety) between Basta Ultra Herbicide (*211 g/L Glufosinate-P-ammonium*) and the registered product, Basta Herbicide (200 g/L Glufosinate Ammonium). The formulation type was the same (Soluble Concentrate). The active ingredient was also the same though consisted of only one isomer of glufosinate ammonium.

Trials consisted of small plot field trials (randomised complete block design, 4 replications) conducted in a wide range of crops and target weeds in Western Australia, New South Wales, South Australia, Victoria, and Queensland. The products (test and reference) were tested at multiple rates (representing ½x, 1x, and 2x recommended label rate or ½ x, 1 x) on their own. Four trials tested crop safety using the reference product and safe use extrapolated to the test product. The trials were appropriately designed (sufficient statistical integrity) to measure and compare efficacy across the test and reference products and thus determine equivalence in the field. The trials were conducted under field conditions and in commercial situations suitable for representing of how and where this product would be used. Assessments for efficacy was based on weed counts and percentage weed control while crop safety observed any phytotoxic symptoms.

In all treatments, Basta Ultra Herbicide showed weed control levels greater than 95% and there were no significant differences between Basta Ultra Herbicide and the registered reference product, Basta Herbicide, for any measured factor. Thus, at label rates, Basta Ultra Herbicide showed commercial levels of control of all weeds.

Liberty Ultra Herbicide

Twenty-one replicated trials are provided in support of equivalence (efficacy and crop safety) between Liberty Ultra Herbicide (*211 g/L Glufosinate-P-ammonium*) and the registered product, Liberty Herbicide (200 g/L Glufosinate Ammonium). The formulation type was the same (Soluble Concentrate), active ingredient was also the same though consisted of only one isomer of glufosinate ammonium.

The trials consisted of small plot field trials (randomised complete block design, 4 replications) conducted in commercial canola crops in Western Australia, New South Wales, and Victoria. The target test weeds included annual ryegrass, wild oats, dead nettle, shepherds purse, common sowthistle, toadrush, subclover,

wireweed, volunteer wheat, volunteer lupins, liverseed grass, windmill grass, common purslane, stinkgrass, turnip weed, and capeweed. The products were tested at multiple rates (representing ½x, 1x, and 2x recommended label rate or ½ x, 1 x) in on their own or mixture with other herbicides. Assessments for efficacy was made by weed counts and percentage weed control while safety observed crop biomass, phytotoxic symptoms, and yield. The trials were appropriately designed (sufficient statistical integrity) to measure and compare efficacy across the test and reference products and thus determine equivalence in the field. The trials were conducted under field conditions and in commercial cropping situations suitable for representing of how and where this product would be used.

There were no significant differences between Liberty Ultra Herbicide and the registered product, Liberty Herbicide, for any measured factor. At label rates, the product showed commercial levels of control of all weeds.

Crop safety

Basta Ultra Herbicide

In all trials, no phytotoxicity was detected as long as contact was not made between the herbicide and the crop plant. The test product was shown to be crop-safe for coffee via extrapolation from the reference product.

Liberty Ultra Herbicide

In the trials, there was detection of early transient phytotoxicity occasionally but with no negative impacts on crop biomass or yield. The test product was shown to be compatible in mixture with a range of herbicides and was plantback safe for cereals and pulses.

Recommendations

Based on the trail results, Basta Ultra Herbicide is equivalent to Basta Herbicide for both crop safety (multiple crop species) and for efficacy (multiple weed species).

Likewise, results from trials showed that Liberty Ultra Herbicide is equivalent to Liberty Herbicide for both crop safety (canola) and for efficacy against the tested weeds.

Appropriate label restrictions have been included on the labels to ensure product efficacy. For example, “DO NOT apply when rain is expected within 4 hours or final weed control may be reduced” addresses the risk of product being washed off by rain prior to adequate contact time with the foliage. The label also contains precautionary measures to prevent damage to host crops, including “DO NOT allow spray to contact any part of the crop as severe damage or crop destruction may result.”

Spray drift assessment

Regulatory Acceptable Levels (RALs) were established using the APVMA Spray Drift Assessment Tool (SDRAT), or Spray Drift Management Tool (SDMT), by each risk area, in order to calculate the appropriate spray drift buffer zones for Basta Ultra Herbicide and Liberty Ultra Herbicide.

Human health

Risks from spraying activities were estimated using the APVMA Spray Drift Risk Assessment Tool 2023 (SDRAT). Results from the SDRAT indicate no buffer zones are required when spraying Basta Ultra Herbicide and Liberty Ultra Herbicide by ground boom at <0.5 m and <1 m height and using a MEDIUM droplet size. It is noted that product is a severe eye irritant and causes skin irritation. The risk to bystanders from spray drift was mitigated by inclusion of the restraint 'DO NOT allow bystanders to come into contact with the spray cloud.'

Residues and trade

In a dairy cow transfer study considered by the 2012 JMPR (re-evaluation of glufosinate), the highest residues of glufosinate (1.63 mg/kg) were observed in liver after feeding at 4.0 ppm in the diet (noting this was based on 3 ppm glufosinate + 1 ppm MPP, which would be appropriate for spray drift onto a non-GM animal feed). The Australian MRL for mammalian offal is 5 mg/kg and the following relevant overseas MRLs for liver/ offal:

For residues in liver to be at 3 mg/kg (the Codex and EU MRL), the maximum feeding level (RAL) is 7.36 ppm.

Environment

The RAL of 8.7 µg ac/L for the protection of natural aquatic areas is based on the E_rC_{10} 8.7 µg ac/L for toxicity of the representative SL formulation of glufosinate-p-ammonium to *Anabaena flos-aquae* and an assessment factor of 1.

The RAL of 5167 g ac/ha for the protection of pollinator areas is based on the contact LD_{50} 31 µg ac/bee for toxicity of technical glufosinate-p-ammonium to *Apis mellifera*, an assessment factor of 2.5, and a conversion factor of 1000 / ExpE 2.4 to account for the surface area of a bee.

The RAL of 34 g ac/ha for the protection of vegetation areas is based on the HR_5 34 g ac/ha derived from a species sensitivity distribution (SSD) analysis of the post-emergent ER_{50} values for nine plant species and an assessment factor of 1.

Table 5: Summary of RALs for Basta Ultra Herbicide and Liberty Ultra Herbicide

Sensitive area	Regulatory Acceptable Level	
	Level of active	Units
Bystander	-	g/ha
Livestock	7.36	ppm
Aquatic	8.7	µg/L
Pollinator	5167	g/ha
Vegetation	34	g/ha

To address spray drift risks to the sensitive areas, buffer zones were calculated by the Spray drift risk assessment tool (SDRAT) and Spray drift management tool (SDMT) using the above RALs. Basta Ultra Herbicide will be applied by ground boom sprayers while Liberty Ultra Herbicide will be applied by both ground boom sprayers and Optical Spot Spray Technologies. The following buffer zones were determined for the sensitive areas and incorporated into the product labels (see *Labelling requirements* section below).

Basta Ultra Herbicide

Buffer zones for boom sprayers

Application rate	Boom height above the target canopy	Mandatory downwind buffer zones (metres)				
		Bystander areas	Natural aquatic areas	Pollinator areas	Vegetation areas	Livestock areas
Up to 2800 mL/ha	0.5 m or lower	0	15	0	0	0
	1.0 m or lower	0	50	0	25	10
Up to 1600 mL/ha	0.5 m or lower	0	10	0	0	0
	1.0 m or lower	0	30	0	15	0
600 mL/ha or lower	0.5 m or lower	0	0	0	0	0
	1.0 m or lower	0	15	0	5	0

Liberty Ultra Herbicide

Buffer zones for boom sprayers

Application rate	Boom height above the target canopy	Mandatory downwind buffer zones (metres)				
		Bystander areas	Natural aquatic areas	Pollinator areas	Vegetation areas	Livestock areas
Up to 2000 mL/ha	0.5 m or lower	0	10	0	0	0
	1.0 m or lower	0	40	0	20	0
Up to 1600 mL/ha	0.5 m or lower	0	10	0	0	0
	1.0 m or lower	0	30	0	15	0
	0.5 m or lower	0	0	0	0	0

Up to 1100 mL/ha	1.0 m or lower	0	25	0	10	0
800 mL/ha or lower	0.5 m or lower	0	0	0	0	0
	1.0 m or lower	0	20	0	10	0

Buffer zones for Optical Spot Spray Technologies (OSST)

Application rate	**Mandatory downwind buffer zones (metres)**				
	Bystander areas	**Natural aquatic areas**	**Pollinator areas**	**Vegetation areas**	**Livestock areas**
Up to a maximum of 2000 mL/ha	**0**	**30**	**0**	**10**	**0**

Labelling requirements

Company Name: BASF AUSTRALIA LTD

Product Name: Basta Ultra Herbicide

APVMA Approval No: 94734 / 143495

Label Name:	Basta Ultra Herbicide

Signal Headings:	CAUTION KEEP OUT OF REACH OF CHILDREN READ SAFETY DIRECTIONS BEFORE OPENING OR USING

Constituent Statements:	ACTIVE CONSTITUENT: 211 g/L Glufosinate-P-ammonium

Mode of Action:	GROUP 10 HERBICIDE

Statement of Claims:	For non-residual control of broadleaf and grass weeds in various situations as specified in the DIRECTIONS FOR USE table

Net Contents:	1L - 1000L

Restraints:	

Directions for Use:	This section contains file attachment. File Name: BASTA Ultra DFU table final.docx File Size: 29936 bytes

Other Limitations:	

Withholding Periods:	HARVEST: Blackberry, blackcurrants, blueberries, boysenberry, citrus fruit, grapes, loganberry, olives, raspberry, strawberries, tomatoes, tree nuts: NOT REQUIRED WHEN USED AS DIRECTED. Tropical and sub-tropical fruits – inedible peel, (avocado, banana, feijoa, guava, kiwifruit, litchi, mango, pawpaw, passionfruit, pineapple, pitaya (dragon fruit) and rambutan): NOT REQUIRED WHEN USED AS DIRECTED.

	Pome and stone fruit: DO NOT HARVEST FOR 21 DAYS AFTER APPLICATION. Sugarcane: DO NOT HARVEST FOR 16 WEEKS AFTER APPLICATION. Green Bean / French Bean: DO NOT HARVEST FOR 4 WEEKS AFTER APPLICATION. Date palms, green tea, native foods: DO NOT HARVEST FOR 1 DAY AFTER APPLICATION. DO NOT HARVEST LEAVES FROM NATIVE PEPPER OR WATTLES THAT ARE CLOSE TO THE GROUND FOR FOOD USES. Coffee: NOT REQUIRED WHEN USED AS DIRECTED. Grazing: Sugarcane: DO NOT GRAZE OR CUT FOR STOCK FOOD FOR 16 WEEKS AFTER APPLICATION. Green Bean / French Bean: DO NOT GRAZE OR CUT TREATED AREAS FOR STOCKFOOD FOR 4 WEEKS AFTER APPLICATION. All other crops: DO NOT GRAZE OR CUT TREATED AREAS FOR STOCK FOOD FOR 8 WEEKS AFTER APPLICATION.

Trade Advice:	Export of Treated Produce Growers should note that suitable MRLs or import tolerances may not be established in all markets for produce treated with BASTA Ultra Herbicide. If you are growing produce for export, please check with BASF Australia Ltd for the latest information on MRLs and import tolerances BEFORE using BASTA Ultra Herbicide.

General Instructions:	This section contains file attachment. File Name: Basta Ultra General Instructions.docx File Size: 46785 bytes

Resistance Warning:	Resistant Weeds Warning GROUP 10 HERBICIDE BASTA Ultra Herbicide is a member of the phosphinic acid group of herbicides. BASTA ULTRA is an inhibitor of glutamine synthetase. For weed resistance management BASTA ULTRA is a Group 10 herbicide. Some naturally occurring weed biotypes resistant to BASTA ULTRA and other Group 10 herbicides may exist through normal genetic variability in any weed population. The resistant individuals can eventually dominate the weed population if these herbicides are used repeatedly. These resistant weeds will not be controlled by BASTA ULTRA or other Group 10 herbicides. Since occurrence of resistant weeds is difficult to detect prior to use, BASF Australia Ltd accepts no liability for any losses that may result from the failure of BASTA ULTRA to control resistant weeds.

Precautions:	Re-entry Period DO NOT enter treated areas until spray has dried. If prior entry is necessary, wear cotton overalls buttoned to the neck and wrist (or equivalent clothing) and chemical resistant gloves. Clothing must be laundered after each day's use. Re-entry statement for the general public on sports fields: DO NOT allow entry into treated areas until the spray has dried.

Protections:	PROTECTION OF WILDLIFE, FISH, CRUSTACEANS AND ENVIRONMENT Very toxic to aquatic life. DO NOT contaminate wetlands or watercourses with this product or used containers. Moderately toxic to wild mammals. Restraints on the label must be observed to protect native wildlife. PROTECTION OF CROPS, NATIVE AND OTHER NON-TARGET PLANTS DO NOT apply on desirable foliage or allow spray to drift onto the foliage of desirable plants, trees or vines, as damage will occur. DO NOT allow product to contact green or uncalloused bark (such as on desirable young trees and vines) or cut, cracked, damaged or wounded tissue, where the affected surface is not adequately healed. BASTA ULTRA may be used around desirable trees/vines less than two years old provided they are effectively shielded from spray and spray drift. DO NOT allow desirable plant foliage to contact any inert surface, such as plastic mulches, which have been treated with BASTA ULTRA. DO NOT apply BASTA ULTRA to recently fumigated or sterilised soil. INTEGRATED PEST MANAGEMENT Toxic to beneficial arthropods. Not compatible with integrated pest management (IPM) programs utilising beneficial arthropods. Minimise spray drift to reduce harmful effects on beneficial arthropods in non-crop areas.

Storage and Disposal:	STORAGE Store in the closed, original container in a cool, well-ventilated area. Do not store for prolonged periods in direct sunlight. DISPOSAL Triple-rinse containers before disposal. Add rinsings to spray tank. DO NOT dispose of undiluted chemicals on site. If recycling, replace cap and return clean containers to recycler or designated collection point. If not recycling, break, crush, or puncture and deliver empty packaging or unused product to an approved waste management facility. If an approved waste management facility is not available, dispose of empty container or unused product in compliance with relevant local, state or territory government regulations. DO NOT burn empty containers or product. Do not re-use empty container for any other purpose. (100 -110 L container) If tamper evident seals are broken prior to initial use, then the integrity of the contents cannot be assured. Empty container by pumping through dry-break connection system. Do not attempt to breach the valve system or the filling point, or contaminate the container with water or other products. Ensure that the coupler, pump, meter, and hoses are disconnected, triple rinsed and drained after each use. When empty, or contents no longer required, return the container to the point of purchase. (1000 L container) If tamper evident seals are broken prior to initial use, then the integrity of the contents cannot be assured. Empty product as required into application equipment. Do not attempt to breach the valve system or filling point, or contaminate the container with water or other products. Ensure that equipment used in transfer of the product is disconnected, triple rinsed and drained after each use. When the container is empty, close all caps and valves and return the container to the point of purchase.

Safety Directions:	Will damage the eyes. Will irritate the skin. Avoid contact with eyes and skin. If product in eyes, wash it out immediately with water. If product on skin, immediately wash area with soap and water. When using together with other products, consult their label safety directions. When opening the container and preparing spray and using the prepared spray wear cotton overalls buttoned to the neck and wrist (or equivalent clothing) and a washable hat, elbow length chemical resistant gloves and goggles. Wash hands after use. After each day's use, wash gloves, goggles and contaminated clothing.

First Aid Instructions:	If poisoning occurs, contact a doctor or Poisons Information Centre. Phone Australia 131126; New Zealand 0800 764 766.

First Aid Warnings:	

RESTRAINTS

DO NOT apply with aircraft.
DO NOT apply when rain is expected within 4 hours or final weed control may be reduced.
DO NOT apply to weeds under stress due to, for example, very dry, very wet, frosty, or diseased conditions.
DO NOT apply more than two applications up to 2.5 L/ha or more than three applications up to 2.1 L/ha in orchards, plantations, forestry plantations, date palms, native foods, or oil tea tree.
DO NOT apply if heavy rains or storms are forecast within 3 days.
DO NOT irrigate to the point of water runoff from the treatment area for at least 3 days after application.

SPRAY DRIFT RESTRAINTS

Specific definitions for terms used in this section of the label can be found at apvma.gov.au/spraydrift

DO NOT allow bystanders to come into contact with the spray cloud.

DO NOT apply in a manner that may cause an unacceptable impact to native vegetation, agricultural crops, landscaped gardens and aquaculture production, or cause contamination of plant or livestock commodities, outside the application site from spray drift. The buffer zones in the relevant buffer zone table/s below provide guidance but may not be sufficient in all situations. Wherever possible, correctly use application equipment designed to reduce spray drift and apply when the wind direction is away from these sensitive areas.

DO NOT apply unless the wind speed is between 3 and 20 kilometres per hour at the application site during the time of application.

DO NOT apply if there are hazardous surface temperature inversion conditions present at the application site during the time of application. Surface temperature conditions exist most evenings one to two hours before sunset and persist until one to two hours after sunrise.

DO NOT apply by a boom sprayer unless the following requirements are met:

- spray droplets not smaller than a MEDIUM spray droplet size category

- minimum distances between the application site and downwind sensitive areas (see 'Mandatory downwind buffer zones' section of the following table titled 'Buffer zones for boom sprayers') are observed.

Buffer zones for boom sprayers

Application rate	Boom height above the target canopy	Mandatory downwind buffer zones (metres)				
		Bystander areas	Natural aquatic areas	Pollinator areas	Vegetation areas	Livestock areas
Up to 2800 mL/ha	0.5 m or lower	0	15	0	0	0
	1.0 m or lower	0	50	0	25	10
Up to 1600 mL/ha	0.5 m or lower	0	10	0	0	0
	1.0 m or lower	0	30	0	15	0
600 mL/ha or lower	0.5 m or lower	0	0	0	0	0
	1.0 m or lower	0	15	0	5	0

DIRECTIONS FOR USE

A. PLANTATIONS, VINEYARDS and OTHER ROW CROPS

CROP	PEST/DISEASE	RATE	CRITICAL COMMENTS
Blackberry, boysenberry, loganberry, raspberry	Primocane and sucker control	280 mL/ 100L water	Apply as a directed spray to suckers and primocanes. Contact with flowers, developing fruit or desirable foliage will cause damage. Ensure complete coverage of primocanes/suckers by spraying to the point of runoff, preferably when they are less than 15 cm high. A non-ionic wetting agent (1000 g/L) may be added at a rate of 25 mL/100 L or equivalent.
Tropical and sub-tropical fruits – inedible peel, including, Avocado, banana, feijoa, guava, kiwifruit, litchi, mango, pawpaw, passionfruit, pineapple, pitaya (dragon fruit), rambutan plantations Citrus orchards Olive plantations Coffee plantations Pome and stone fruit orchards Tree nut plantations Vineyards	See list of weeds controlled in Table 1.	0.6-2.8L/Ha	Apply as a directed or shielded spray. Refer to the label section **Application** for specific information on application methods. **Warnings**: Do not allow spray or spray drift to contact desirable foliage or green (uncalloused) bark. To avoid potential crop damage, refer to the label sections on **Application** and **PROTECTION OF CROPS, NATIVE AND OTHER NON-TARGET PLANTS.** Controlled Droplet Application equipment must not be used for application in cherry orchards. Basta Ultra may be used around trees/vines less than two years old provided they are effectively shielded from spray and spray drift. The recommended rate of use is determined by the following criteria: **WEED SPECIES** **WEED STAGE OF GROWTH** **WEED DENSITY** **CLIMATIC CONDITIONS** **WEED SPECIES** Apply the appropriate rate to control the least susceptible weed present as per the lists of weeds controlled in the accompanying tables. **WEED STAGE OF GROWTH** Use the lower rate when weeds are young and succulent (grasses: pre-tillering; broadleaves: cotyledons to 4-leaf) or the population is very sparse. A median rate should be used for medium sized plants (grasses: tillering; broadleaves: 4 leaf to advanced vegetative) and the high rate should be used when weeds are mature (grasses: noding to flowering; broadleaves: budding to flowering). **WEED DENSITY:** Use the higher rates when the weed population is dense. **Thorough coverage of weeds is essential for good control. CLIMATIC CONDITIONS** **Best results are achieved when applied under warm humid conditions** (temperatures below 33 °C with a relative humidity above 50 %). Control will be reduced and/or slower under cold conditions. Good results will be achieved under most other conditions, however poor results may occur under hot, dry conditions. Weeds that have been hardened or stunted in growth due to stressed conditions should be treated at the maximum rate. **COVERAGE:** Complete coverage of weeds is essential for good control. Poor coverage may result in re-growth. **PERENNIAL WEEDS:** Apply when weeds are actively growing. Follow up treatments will be necessary to control re-growth of perennial weeds in most cases.

Strawberries, cane berry fruits (inter-row)			Apply as a directed or shielded spray to the inter-row area. Take care not to allow spray or spray drift to contact the crop, including strawberry runners. Refer to **GENERAL INSTRUCTIONS** for warnings concerning plastic mulch and fumigated/sterilised soil. Determine the recommended rate of use by considering the criteria: **WEED SPECIES, WEED STAGE OF GROWTH, WEED DENSITY and CLIMATIC CONDITIONS**, as described above.
Tomatoes (inter-row)			
Blueberries			Take care not to allow spray or spray drift to contact the crop. **DO NOT** apply to young, green, or un-calloused and damaged blueberry plants. **DO NOT** apply to weeds under stress. **DO NOT** apply in unfavourable weather conditions.
Blackcurrant			Take care not to allow spray or spray drift to contact the crop, including foliage, flowers, fruits, or young stems. **DO NOT** make more than 2 applications per season.
Green Bean / French Bean (Field use only)			Use inter-row shielded sprayer with a fan nozzle delivering coarse droplets. Use lower rates when weeds are young, or the population is sparse, and higher rates when weeds are mature or weed population is dense. Apply to actively growing weeds. **DO NOT** apply more than 1 application per season.
Pyrethrum	Spear thistle, cleavers, hawkbit, cats ear, dandelion. Plus, any weeds listed in Table 1	18-43 ml/ 15L water	Apply directly to weeds by knapsack only. Avoid direct contact with pyrethrum.
Duboisia	See list of weeds controlled in Table 1.	0.6-2.8L/Ha	Spray should be directed to the base of the plants avoiding contact with the foliage. Best results are achieved when applied under warm humid conditions. Complete coverage of weeds is essential for good control.
Date Palms (*Phoenix dactylifera*)			**DO NOT** allow spray, including drift, to contact any part of the crop as severe damage or crop destruction may result. It is recommended to use shielded sprayer or hooded spray nozzles when spraying between crop rows or near the emerged crops to avoid crop damage from direct spray and drift. Apply as necessary to actively growing weeds, free from environmental stresses, up to a maximum three (3) applications per season. Rotate herbicide mode of action groups within and across growing seasons. Use suitable ground application equipment, including boom sprayer, back-pack sprayer, handlance sprayer, knapsack, or CDA. Ensure equipment is correctly calibrated. Use higher rates for perennial grass weeds. Increase the application rate as the size, age and/or density of the weeds increase and become more established. Avoid spraying when crops are in flower or fruiting. **DO NOT** harvest leaves from native pepper or wattles that are close to the ground for food uses.
Green Tea (*Camellia sinensis*)			
Native Foods [see Note below]			

Note: Native Foods include:
Wattles (*Acacia spp*.), Lemon myrtle (*Backhousia citriodora*), Finger lime (*Citrus australasica*), Desert lime (*Citrus glauca*), Mullumbimby plum (*Davidsonia jerseyana*), Davidson's plum (*Davidsonia johnsonii*), Queensland Davidson's plum (*Davidsonia pruriens*), Muntrie berry (*Kunzea pomifera*), Desert quandong (*Santalum acuminatum*), Desert raisin (*Solanum centrale*), Anise myrtle (*Syzygium anisatum*), Small Red Apple (*Syzygium fibrosum*), Lilly pilly (*Syzygium lehumannii*), Kakadu plum (*Terminalia ferdinandiana*) and Native pepper (*Tasmanian lanceolata*)

CROP	PEST/DISEASE	RATE	CRITICAL COMMENTS
Sugarcane	See list of weeds controlled in Table 1.	0.6 to 1.6 L/ha (directed application) 0.6 to 2.8 L/ha (shielded/ hooded application)	Determine the recommended rate of use by considering the criteria **WEED SPECIES**, **WEED STAGE OF GROWTH, WEED DENSITY** and **CLIMATIC CONDITIONS**, as described above. Apply as a directed or shielded spray. <u>Directed application:</u> Refer to recommendations for weed control in Table 1 to check that a label rate in the range 0.6-1.6 L/ha for directed application is suitable for control of the target weed at its current stage of growth. Plant cane – **DO NOT** apply earlier than just prior to out-of-hand stage. Apply spray mixture across the inter-row area between cane rows. Avoid all contact with cane shoot growing points and minimise spray contact with green cane foliage. Excessive contact with sugarcane plants may result in damage. Ratoon cane - Apply spray mixture across the inter-row area between cane rows. Do not apply until cane reaches 100 cm overall cane height (top of plants) or 20 cm to dewlap (growing point). Avoid all contact with ratoon shoot growing points and minimise spray contact with green cane foliage. Excessive contact with sugarcane plants may result in damage. Use nozzles that deliver coarse to very coarse droplets and minimise drift, whilst ensuring complete coverage of weeds. The Irvin spray boom has been found to be suitable for the application of Basta Ultra in sugarcane. Use of a bar at the front of the boom to knock down taller weeds may help ensure good coverage and increase performance. <u>Shielded or hooded application:</u> Refer to recommendations for weed control in Table 1 to check that a label rate in the range 0.6-2.8 L/ha for shielded or hooded applications is suitable for control of the target weed at its current stage of growth. Can be applied at all sugarcane stages provided that the shield is set up so as to completely avoid spray contact with sugarcane plants. Use nozzles that deliver coarse to very coarse droplets and minimise drift, whilst ensuring complete coverage of weeds. Take care to prevent spray contact with green cane foliage and avoid contact with growing point. Excessive contact with sugarcane plants may result in damage.

			Directed, shielded, or hooded application: To avoid potential crop damage refer to the label sections on: **1. Application.** **2. PROTECTION OF CROPS, NATIVE AND OTHER NON-TARGET PLANTS.**

B. COMMERCIAL, INDUSTRIAL, NON-AGRICULTURAL AREAS, FENCELINES IN AGRICULTURAL AREAS and FORESTRY PLANTATIONS

CROP	PEST/DISEASE	RATE	CRITICAL COMMENTS
Commercial & industrial areas, forest plantations, rights-of-way and other non-agricultural areas Fencelines in agricultural areas	See list of weeds controlled in Table 1.	0.6 to 2.8 L/ha	Determine the recommended rate of use by considering the criteria **WEED SPECIES, WEED STAGE OF GROWTH, WEED DENSITY** and **CLIMATIC CONDITIONS** as described above in **Part A** of the Directions for Use table, under Critical Comments. **Warnings: DO NOT** allow spray or spray drift to contact desirable plants. To avoid potential crop damage, refer to the label sections on: **Application and PROTECTION OF CROPS, NATIVE AND OTHER NON-TARGET PLANTS.**
Commercial & industrial areas, forest plantations, rights-of-way and other non-agricultural areas	Volunteer or wildling *Pinus spp*.	Handgun and knapsack application 280 mL/ 100 L water	Basta Ultra is a non-selective herbicide and will affect most weeds. Its forestry use is designed to improve the control of *Pinus spp*. wildings when pre-plant weed control is carried out. To broaden the weed spectrum, mixing with other herbicides such as glyphosate and metsulfuron-methyl at labelled rates may be necessary. **APPLICATION** Apply with an adjuvant. High water volumes or nozzle systems should be used to achieve complete coverage of weeds, which is essential for good control. Handgun and knapsack rates are based on the application of 1000 L of spray mixture per sprayed hectare. This is usually adequate to thoroughly wet dense stands of weeds. Less dense

Forestry plantations (pre-plant plantation establishment)			stands will require lower water rates. Basta Ultra does not provide residual weed control. Refer also to comments in the General Instructions which relate to application. **WEED GROWTH STAGE AND CONDITION** Use on *Pinus spp*. ≤ 15 cm is recommended to maximise efficacy. Apply when weeds are actively growing. Results will be reduced if treated plant is under stress due to very dry, very wet, frosty, or diseased conditions. **COVERAGE** Complete coverage of target is essential for good control. Poor coverage may result in re-growth. **CLIMATIC CONDITIONS** Best results are achieved when applied under warm, humid conditions (temperatures below 33 °C with a relative humidity above 50 %). Good results will be achieved under most other conditions, however poor results may occur under hot, dry conditions. Trials have shown better results from autumn and winter applications than from spring and summer applications. **SYMPTOMS** Visible symptoms will appear within 3 weeks; tree death may take several months depending on initial coverage and size of tree. Follow up treatments may be necessary to control re-growth in some cases.
Line-marking on sports grounds	Turf grasses and other weeds	150 to 300 mL /100 L water	Refer to General Instructions. Basta Ultra is a non-selective, non-residual herbicide with limited translocation potential. It is therefore ideally suited for line-marking on sports fields where precise weed control is required. Apply at 6 – 8-week intervals depending on growth of turf. Apply using single boom or hand wand.

C. OIL TEA TREE, NURSERY STOCK (NON FOOD), FOLIAGE, CUT FLOWERS, WILDFLOWERS

CROP	PEST/DISEASE	RATE	CRITICAL COMMENTS
Oil tea tree Nursery stock [(non-food) – seedlings, plugs, potted colour, trees, shrubs, foliage plants, palms, grasses, fruit trees (non- bearing)], cut flowers including wildflowers and foliage. Wildflower crops [see Note below]	See list of weeds controlled in Table 1	Boom spray: 0.6 to 2.8 L/ha Hand-gun: 180 to 280 mL/100 L	Apply spray treatment along the sides of crops and between rows of crops. Avoid overspray or incidental spray drift onto crop, as damage or death of plants may occur. Apply as necessary to actively growing weeds up to a maximum three applications per season. Use suitable ground application equipment. Ensure equipment is correctly calibrated. Use higher rates for perennial grass weeds. Increase the application rate as the size of target weeds increases. Only apply spray to actively growing grass weeds free from environmental stresses. Avoid spraying when crops are in flower or fruiting.

Note: Wildflower crops include
Banksia species (*Banksia spp.*) – cultivars and hybrids, Berzelia or button brush (*Berzelia spp.*), Black kangaroo paw (*Macropidia spp.*) – cultivars and hybrids, Christmas bells (*Blandfordia grandiflora*), Christmas bush (*Ceratopetalum gummiferum*), Geraldton wax and Waxflower species (*Chamelaucium spp.*) – cultivars and hybrids, Kangaroo paw (*Anigozanthos spp.*) – cultivars and hybrids, Leucadendron species – cultivars and hybrids, Leucospermum species (*Leucospermum spp.*) – cultivars and hybrids (pincushions), Protea (*Protea spp.*) – cultivars and hybrids, Riceflower (*Ozothamnus diosmifolius*), Waratah species (*Telopea speciosissima*) – cultivars and hybrids.

NOT TO BE USED FOR ANY PURPOSE, OR IN ANY MANNER, CONTRARY TO THIS LABEL UNLESS AUTHORISED UNDER APPROPRIATE LEGISLATION.

Table 1: List of weeds controlled with recommended application rate.

ANNUAL WEEDS		APPLICATION RATE Refer to maximum rate in Directions for Use table		
COMMON NAME	**SCIENTIFIC NAME**	**Boom or directed sprayer L/ha**	**Handgun mL/100 L**	**Knapsack mL/ 15 L**
Amaranthus spp.	*Amaranthus* spp.	1.2 to 2.8	280	43
Apple of Peru	*Nicandra physalodes*	0.9 to 1.6	180	27
Argentine peppercress	*Lepidium bonariense*	1.2 to 1.6	180	27
Asthma plant	*Euphorbia hirta*	1.6 to 2.8	280	43
Awnless barnyard grass	*Echinochloa colona*	1.4 to 2.0	210	32
Barley grass	*Hordeum leporinum*	1.2 to 1.6	180	27
Barnyard grass	*Echinochloa crus galli*	1.2 to 2.8	280	43
Bell vine	*Ipomoea plebeia*	1.2 to 2.8	280	43
Billy goat weed	*Ageratum conyzoides*	1.2 to 2.8	280	43
Blue billygoat weed	*Ageratum houstonianum*	1.6 to 2.8	280	43
Bitter cress	*Cardamine hirsuta*	1.2 to 2.8	280	43
Black bindweed (buckwheat) (refer Note 2)	*Fallopia convolvulus*	1.1 to 2.8	280	43
Bladder ketmia	*Hibiscus trionum*	1.6 to 2.8	280	43
Bordered panic	*Entolasia marginata*	1.2 to 2.4	240	36
Brome grasses (refer Note 1)	*Bromus* spp.	1.2 to 1.6	180	27
Calopo	*Calopogonium mucunoides*	1.2 to 2.8	280	43
Caltrop burr	*Tribulus terrestris*	1.6 to 2.8	280	43
Capeweed	*Arctotheca calendula*	0.9 to 2.8	280	43
Chickweed	*Stellaria media*	1.6 to 2.8	280	43
Clover (subterranean)	*Trifolium subterraneum*	1.1 to 1.6	180	27
Cobbler's pegs	*Bidens pilosa*	1.2 to 2.8	280	43
Common morning glory	*Ipomoea purpurea*	1.2 to 2.8	280	43
Common storksbill	*Erodium cicutarium*	0.9 to 2.4	240	36
Creeping cindarella weed	*Synadrella vialis*	2.8	280	43
Crowsfoot grass	*Eleusine indica*	1.6 to 2.8	280	43
Dead nettle	*Lamium amplexicaule*	1.2 to 2.8	280	43
Dwarf crumbweed	*Chenopodium pumilo*	1.6 to 2.8	280	43
Fat hen	*Chenopodium album*	1.6 to 2.8	280	43
Field sorrel (Dock, Sheep sorrel)	*Rumex acetosella*	1.6 to 2.8	280	43
Fleabane (Tall, Flaxleaf)	*Conyza spp (syn Erigeron spp)*	1.6 to 2.8	280	43
Flatweed / catsear	*Hypochoeris radicata*	1.6 to 2.8	280	43
Fumitory	*Fumaria officinalis*	1.1 to 2.8	280	43

Green crumbweed	*Chenopodium carinatum*	1.2 to 2.8	280	43
Common heliotrope	*Heliotropium europaeum*	1.6 to 2.8	280	43
Herb robert	*Geranium robertianum*	1.6 to 2.8	280	43
Lesser canary grass	*Phalaris minor*	1.6 to 2.8	280	43
Liverseed grass	*Urochloa panicoides*	0.9 to 2.8	280	43
Marshmallow	*Malva parviflora*	1.6 to 2.8	280	43
Medics (annual)	*Medicago* spp.	0.6 to 2.8	280	43
Milk thistle	*Sonchus oleraceus*	1.2 to 2.8	280	43
Mintweed	*Salvia reflexa*	1.6 to 2.8	280	43
Mouse barley	*Hordeum murinum*	1.6 to 2.8	280	43
New Zealand spinach	*Tetragonia tetragoniodes*	1.2 to 2.8	280	43
Nutgrass	*Cyperus rotundus*	2.8	280	43
Patterson's curse	*Echium plantagineum*	0.6 to 1.6	180	27
Peanuts	*Arachis hypogaea*	0.9 to 1.6	180	27
Pigweed	*Portulaca oleracea*	1.6 to 2.8	280	43
Pinkburr	*Urena lobata*	1.2 to 2.8	280	43
Plantain	*Plantago lanceolata*	2.8	280	43
Potato weed	*Galinsoga parviflora*	1.2 to 2.8	280	43
Prairie grass (refer Note 1)	*Bromus unioloides*[1]	2.4 to 2.8	280	43
Prickly lettuce	*Lactuca serriola*	1.6 to 2.8	280	43
Prickly malvastrum	*Malvastrum coromandelianum*	1.6 to 2.8	280	43
Red natal grass	*Rhynchelytrum repens*	1.2 to 2.8	280	43
Rhodes grass	*Chloris gayana*	1.6 to 2.8	280	43
Ryegrass (annual)	*Lolium rigidum*	1.2 to 2.8	280	43
Saffron thistle	*Carthamus lanatus*	0.9 to 2.8	280	43
St. Barnaby's thistle	*Centaurea solstitialis*	0.9 to 2.8	280	43
Sago weed	*Plantago cunninghamii*	1.2 to 1.6	180	27
Scarlet pimpernel	*Anagallis arvensis*	1.2 to 2.8	280	43
Setaria	*Setaria italica*	1.2 to 2.8	280	43
Sharp buttercup	*Ranunculus muricatus*	1.6 to 2.8	280	43
Sheep thistle	*Carduus tenuiflorus*	1.4 to 2.8	280	43
Shepherd's purse	*Capsella bursa-pastoris*	2.8	280	43
Silver grass	*Vulpia myuros*	1.2 to 2.8	280	43
Sorghum/sudax	*Sorghum bicolor*	1.2 to 2.8	280	43
Speedwell	*Veronica* spp.	0.6 to 2.8	280	43
Square weed	*Spermacoce latifolia*	1.2 to 2.8	280	43
Stagger weed	*Stachys arvensis*	1.2 to 2.8	280	43
Star of Bethlehem	*Ipomoea quamoclit*	1.2 to 2.8	280	43
Summer grass	*Digitaria ciliaris*	1.2 to 2.8	280	43
Thickhead	*Crassocephalum crepidioides*	1.6 to 2.8	280	43
Three cornered jack	*Emex australis*	1.2 to 2.8	280	43
Tomato	*Lycopersicon esculentum*	1.2 to 2.8	280	43
Townsville stylo	*Stylosanthes humilis*	0.6 to 1.6	180	27
Tridax daisy	*Tridax procumbens*	1.6 to 2.8	280	43
Turnip weed	*Rapistrum rugosum*	1.6 to 2.8	280	43
Variegated thistle	*Silybum marianum*	1.4 to 2.8	280	43
Wheat	*Triticum aestivum*	2.4 to 2.8	280	43
Wild carrot	*Daucus glochidiatus*	1.2 to 2.8	280	43
Wild gooseberry	*Physalis minima*	1.2 to 2.8	280	43
Wild mustard	*Sysimbrium orientale*	1.2 to 2.8	280	43
Wild oats	*Avena* spp.	1.6 to 2.8	280	43
Wild radish	*Raphanus raphanistrum*	2.8	280	43

Winter grass	*Poa annua*	1.6 to 2.8	280	43
Wireweed	*Polygonum aviculare*	0.9 to 2.8	280	43
PERENNIAL WEEDS				
Blady grass	*Imperata cylindrica*	1.6 to 2.4	240	36
Cape tulip	*Homeria* spp.	1.2 to 1.6	180	27
Centro	*Centrosema pubescens*	0.6 to 2.8	280	43
Clover glycine	*Glycine latrobeana*	0.6 to 1.6	180	27
Couch grass	*Cynodon dactylon*	1.4 to 2.8	280	43
Cow pea	*Vigna unguiculata*	0.6 to 1.6	180	27
Giant sensitive plant	*Mimosa invisa*	1.2 to 2.8	280	43
Greenleaf desmodium	*Desmodium intortum*	0.6 to 1.6	180	27
Johnson grass	*Sorghum halepense*	1.6 to 2.8	280	43
Panicum spp.	*Panicum* spp.	1.2 to 2.8	280	43
Paspalum spp.	*Paspalum* spp.	1.6 to 2.8	280	43
Perennial bindweed	*Convolvulus arvensis*	1.2 to 1.6	180	27
Perennial ryegrass	*Lolium perenne*	1.6 to 2.8	280	43
Phasey bean	*Macroptilium lathyroides*	1.6 to 2.8	280	43
Shamrock	*Oxalis corymbosa*	1.6	180	27
Sida weed	*Sida retusa*	1.6 to 2.8	280	43
Silver leaf desmodium	*Desmodium uncinatum*	2.4 to 2.8	280	43
Siratro	*Macroptilium atropurpureum*	0.6 to 1.6	180	27
Stink grass	*Eragrostis cilianensis*	1.6 to 2.8	280	43
White clover	*Trifolium repens*	1.6 to 2.8	280	43
White eye	*Richardia brasiliensis*	1.6 to 2.8	280	43
Willow herb	*Epilobium* spp.	2.4 to 2.8	280	43

Notes:

1. Well-established clumps of prairie grass and brome grasses may only be suppressed at these rates. Follow-up treatments may be necessary to control regrowth.
2. Good control will be achieved on small and medium sized plants only in non-crop situation.

GENERAL INSTRUCTIONS

BASTA ULTRA is a non-volatile herbicide with non-selective activity against many annual and perennial broadleaf weeds and grasses. BASTA ULTRA is absorbed by plant foliage and green stems. It is not significantly translocated as an active herbicide throughout the plant, and therefore will only kill that part of a green plant that is contacted by spray. BASTA ULTRA does not provide residual weed control. Visible symptoms of control appear in 3 to 7 days, but complete desiccation may take 20 to 30 days under cool conditions. Best results are achieved when application is made under good growing conditions. Application to weeds under stress (e.g. due to continuous severe frosts, dry or waterlogged conditions) should be avoided.

Soil fumigation / sterilisation

BASTA ULTRA is metabolised (broken down) by microorganisms in the soil to become inactive. Soil fumigation or sterilisation will reduce the number of microorganisms present, thus slowing the breakdown of BASTA ULTRA. As damage to transplants or seedlings may occur, it is not advisable to apply BASTA ULTRA in conjunction with soil fumigation or sterilisation.

Plastic mulches

BASTA ULTRA will remain active on inert surfaces such as plastic. Special care should be taken when applying BASTA ULTRA over plastic mulches, as plant contact with the mulch after spraying may result in crop damage.

Mixing

BASTA ULTRA mixes easily with water. Clean water should always be used for mixing with BASTA ULTRA. Ensure that the spray tank is free of any residues of previous spray materials.

Two-thirds fill the spray tank with clean water, and with agitator operating add the required amount of BASTA ULTRA. Add other relevant compatible products. Top the tank up to the required volume with clean water with agitator running.

Application

A. Orchards, plantations, vineyards, sugarcane and other row crops and

B. Commercial, industrial, non-agricultural areas, fencelines in agricultural areas and forestry plantations

Apply by ground spraying equipment only. Aim to apply a thorough and even coverage of spray to the target plant. Dense stands of weeds should be thoroughly wetted with spray. Incomplete coverage may result in poor control.
Equipment set-up should be such that adequate coverage, penetration and volume of spray liquid can be achieved while the potential for off-target movement is minimised.

Boom, Shielded/Hooded or Directed Sprayer Equipment
BASTA ULTRA should be applied at label rates (refer to specific column in the list of weeds controlled) in sufficient water to give thorough coverage of weeds. It has been found that 300 to 500 L/ha has given good results under most weed conditions.
Special care must be taken when using sprayer/slasher combination units not to cause dust and turbulence, which can carry spray into non-target areas.

For use in sugarcane, shielded or hooded sprayers should be set up in such a way to ensure that no spray intercepts susceptible parts of the crop being sprayed, but provides good coverage of weeds. Directed spraying equipment should be set up in such a way that practically no spray intercepts susceptible parts of the crop being sprayed, but provides good coverage of weeds.

Knapsack and Handgun Equipment
BASTA ULTRA should be applied at label rates (refer to specific columns in the list of weeds controlled) in adequate water to thoroughly wet the weeds being sprayed, i.e., 500 to 1000 L/ha. Dense stands will require up to 1000 L/ha of spray mixture, whereas less dense stands will require less water. High volume application using hollow-cone nozzles for hand spraying is recommended.

Controlled Droplet Application (CDA) Equipment
BASTA ULTRA may be applied through CDA row spraying equipment fitted with a solid (impermeable) shroud or skirt, at rates as recommended for boom or directed sprayers (refer to specific column in the list of weeds controlled), provided thorough spray coverage of weeds can be achieved. Apply preferably when weeds are less than 15 cm in height, with the equipment set up so that the spray dome only just touches the tops of the weeds. A total spray volume of 20 to 30 L/ha has been found to give good results. Do not mix residual herbicides or any spray adjuvants with BASTA ULTRA when using CDA equipment.
Warning: Because the spray solution is highly concentrated particular care must be taken when using BASTA ULTRA through CDA equipment to avoid contact of the spray solution with any part of the crop trunk or canopy. DO NOT apply BASTA ULTRA through equipment fitted with bristle skirts. Particular care should be taken when using CDA equipment around green or uncalloused bark.

Please refer to PROTECTION OF CROPS, NATIVE AND OTHER NON-TARGET PLANTS. CDA equipment must **not** be used for application in cherry orchards.

Sprayer clean-up
Clean all equipment after use by thoroughly flushing with water.

Company Name: BASF AUSTRALIA LTD.

Product Name: Liberty Ultra Herbicide

APVMA Approval No: 94738 / 143503

Label Name:	Liberty Ultra Herbicide

Signal Headings:	CAUTION KEEP OUT OF REACH OF CHILDREN READ SAFETY DIRECTIONS BEFORE OPENING OR USING

Constituent Statements:	ACTIVE CONSTITUENT: 211 g/L Glufosinate-P-ammonium

Mode of Action:	GROUP 10 HERBICIDE

Statement of Claims:	For non-residual control of certain broadleaf and grass weeds in LibertyLink® Canola varieties (with tolerance to Liberty® Ultra Herbicide), fallow and optical spot spray technologies (OSST), as specified in the DIRECTIONS FOR USE table.

Net Contents:	1L - 1000L

Restraints:	This section contains file attachment. File Name: Liberty RESTRAINTS.docx File Size: 16707 bytes

Directions for Use:	This section contains file attachment. File Name: Liberty Ultra DFU table final.docx File Size: 33637 bytes

Other Limitations:	APPLICATION OF LIBERTY® ULTRA HERBICIDE TO CANOLA VARIETIES OTHER THAN LIBERTYLINK® CANOLA VARIETIES (WITH TOLERANCE TO LIBERTY® ULTRA HERBICIDE) WILL RESULT IN SEVERE CROP INJURY OR DEATH OF THE

	CROP.

Withholding Periods:	HARVEST:
	NOT REQUIRED WHEN USED AS DIRECTED. GRAZING: CANOLA: DO NOT GRAZE OR CUT FOR STOCK FOOD FOR 6 WEEKS AFTER APPLICATION. CANOLA GROWN FOR SEED PRODUCTION: DO NOT GRAZE OR CUT FOR STOCK FEED. SUMMER FALLOW: (including optical spot spraying technology): DO NOT GRAZE OR CUT FOR STOCK FOOD A CROP SOWN FOLLOWING A FALLOW SPRAY FOR 6 WEEKS AFTER SOWING. All other situations: DO NOT GRAZE OR CUT TREATED AREAS FOR STOCK FOOD FOR 8 WEEKS AFTER APPLICATION

Trade Advice:	EXPORT OF TREATED PRODUCE Growers should note that suitable MRLs or import tolerances may not be established in all markets for produce treated with Liberty® Ultra Herbicide. If you are growing produce for export, please check with BASF Australia Ltd for the latest information on MRLs and import tolerances BEFORE using Liberty® Ultra Herbicide.

General Instructions:	This section contains file attachment. File Name: GI.docx File Size: 30728 bytes

Resistance Warning:	RESISTANT WEEDS WARNING GROUP 10 HERBICIDE Liberty® Ultra Herbicide is a member of the phosphinic acid group of herbicides. Liberty® Ultra Herbicide is an inhibitor of glutamine synthetase. For weed resistance management Liberty is a Group 10 herbicide. Some naturally-occurring weed biotypes resistant to Liberty® Ultra Herbicide and other Group 10 herbicides may exist through normal genetic variability in any weed population. The resistant individuals can eventually dominate the weed population if these herbicides are used repeatedly. These resistant weeds will not be controlled by Liberty or other Group 10 herbicides. Since occurrence of resistant weeds is difficult to detect prior to use, BASF Australia Ltd accepts no liability for any losses that may result from the failure of Liberty to control resistant weeds. Where resistance to this product is suspected this should be reported either directly to the Australian Pesticides and Veterinary Medicines Authority (APVMA) or through BASF Australia Ltd. LibertyLink® Canola varieties (with tolerance to Liberty® Ultra Herbicide) Canola Resistance and Crop Management Plans Detailed management plans have been developed that outline sound agronomic practices and integrated weed management principles, designed to optimise the performance of LibertyLink® Canola varieties (with tolerance to Liberty Ultra ® Herbicide), minimise the potential for the development of herbicide resistance in weed populations and ensure compliance with the Conditions of the LibertyLink® Canola OGTR approval. The LibertyLink® Canola varieties (with tolerance to Liberty® Ultra Herbicide) Resistance Management and Crop Management Plans should be consulted prior to the use of this product on LibertyLink® Canola varieties. Implementation of the management plans are an essential part of herbicide resistance management. This product is supplied by BASF Australia Ltd on condition that it is used in conjunction with the LibertyLink® Canola varieties (with tolerance to Liberty® Ultra Herbicide) Resistance Management and Crop Management Plans (available on www.crop-solutions.basf.com.au). Pre-plant paddock preparation for Liberty® Ultra Herbicide: Control all existing weeds by cultivation or by using a sufficient rate of knockdown herbicide. This may be a glyphosate or paraquat/diquat-based product.

Precautions:	Re-entry period DO NOT enter treated areas until spray has dried. If prior entry is necessary, wear cotton overalls buttoned to the neck and wrist (or equivalent clothing) and chemical resistant gloves. Clothing must be laundered after each day's use.

Protections:	PROTECTION OF WILDLIFE, FISH, CRUSTACEANS AND ENVIRONMENT Very toxic to aquatic life. DO NOT contaminate streams, rivers or waterways with this product or the used container. PROTECTION OF CROPS, NATIVE AND OTHER NON-TARGET PLANTS Do not apply on desirable foliage (other than LibertyLink® Canola varieties with tolerance to Liberty® Ultra Herbicide) or allow drift onto the foliage or green bark of trees and vines, as damage will occur. INTEGRATED PEST MANAGEMENT Toxic to beneficial arthropods. Not compatible with integrated pest management (IPM) programs utilising beneficial arthropods. Minimise spray drift to reduce harmful effects on beneficial arthropods in non-crop areas.

Storage and Disposal:	STORAGE Store in the closed, original container in a cool, well-ventilated area. Do not store for prolonged periods in direct sunlight. DISPOSAL Triple-rinse containers before disposal. Add rinsings to spray tank. DO NOT dispose of undiluted chemicals on site. If recycling, replace cap and return clean containers to recycler or designated collection point. If not recycling, break, crush, or puncture and deliver empty packaging or unused product to an approved waste management facility. If an approved waste management facility is not available, dispose of empty container or unused product in compliance with relevant local, state or territory government regulations. DO NOT burn empty containers or product. 110 L container If tamper evident seals are broken prior to initial use then the integrity of the contents cannot be assured. Empty container by pumping through dry-break connection system. Do not attempt to breach the valve system or the filling point, or contaminate the container with water or other products. Ensure that the coupler, pump, meter and hoses are disconnected, triple rinsed and drained after each use. When empty, or contents no longer required, return the container to the point of purchase. 1000 L container If tamper evident seals are broken prior to initial use then the integrity of the contents cannot be assured. Empty product as required into application equipment. Do not attempt to breach the valve system or filling point, or contaminate the container with water or other products. Ensure that equipment used in transfer of the product is disconnected, triple rinsed and drained after each use. When the container is empty, close all caps and valves and return the container to the point of purchase.

Safety Directions:	Will damage the eyes. Will irritate the skin. Avoid contact with eyes and skin. If product in eyes, wash it out immediately with water. If product on skin, immediately wash area with soap and water. When using together with other products, consult their label safety directions. When opening the container and preparing spray and using the prepared spray wear cotton overalls buttoned to

	the neck and wrist (or equivalent clothing) and a washable hat, elbow length chemical resistant gloves and goggles. Wash hands after use. After each day's use, wash gloves, goggles and contaminated clothing

First Aid Instructions:	If poisoning occurs, contact a doctor or Poisons Information Centre. Phone Australia 131126; New Zealand 0800 764 766.

First Aid Warnings:	

RESTRAINTS

DO NOT apply to canola varieties other than LibertyLink® Canola varieties with tolerance to Liberty® Ultra Herbicide.
DO NOT apply by aircraft
DO NOT apply by mister.
DO NOT apply when rain is expected within 4 hours or final weed control may be reduced
DO NOT apply if heavy rains or storms are forecast within 3 days.
DO NOT irrigate to the point of water runoff from the treatment area for at least 3 days after application.
DO NOT apply after the early bolting stage (BBCH 33) in canola.
DO NOT apply onto weeds when dew, fog or mist is present.
DO NOT apply to weeds under stress due to, for example, very dry, very wet, frosty, windblasted, insect damaged, nutrient deficient or diseased conditions.

SPRAY DRIFT RESTRAINTS

Specific definitions for terms used in this section of the label can be found at apvma.gov.au/spraydrift

DO NOT allow bystanders to come into contact with the spray cloud.

DO NOT apply in a manner that may cause an unacceptable impact to native vegetation, agricultural crops, landscaped gardens and aquaculture production, or cause contamination of plant or livestock commodities, outside the application site from spray drift. The buffer zones in the relevant buffer zone table/s below provide guidance but may not be sufficient in all situations. Wherever possible, correctly use application equipment designed to reduce spray drift and apply when the wind direction is away from these sensitive areas.

DO NOT apply unless the wind speed is between 3 and 20 kilometres per hour at the application site during the time of application.

DO NOT apply if there are hazardous surface temperature inversion conditions present at the application site during the time of application. Surface temperature conditions exist most evenings one to two hours before sunset and persist until one to two hours after sunrise.

DO NOT apply by a boom sprayer unless the following requirements are met:

- spray droplets not smaller than a MEDIUM spray droplet size category

Buffer zones for boom sprayers

Application rate	Boom height above the target canopy	Mandatory downwind buffer zones (metres)				
		Bystander areas	Natural aquatic areas	Pollinator areas	Vegetation areas	Livestock areas
Up to 2000 mL/ha	0.5 m or lower	0	10	0	0	0
	1.0 m or lower	0	40	0	20	0
Up to 1600 mL/ha	0.5 m or lower	0	10	0	0	0
	1.0 m or lower	0	30	0	15	0
Up to 1100 mL/ha	0.5 m or lower	0	0	0	0	0
	1.0 m or lower	0	25	0	10	0
800 mL/ha or lower	0.5 m or lower	0	0	0	0	0
	1.0 m or lower	0	20	0	10	0

- minimum distances between the application site and downwind sensitive areas (see 'Mandatory downwind buffer zones' section of the following table titled 'Buffer zones for boom sprayers') are observed.

DO NOT apply by Optical Spot Spray Technologies (OSST) unless the following requirements are met:

- spray droplets not smaller than a MEDIUM spray droplet size category

- the release height is not greater than 0.8 metres above the ground

Buffer zones for Optical Spot Spray Technologies (OSST)

Application rate	Mandatory downwind buffer zones (metres)				
	Bystander areas	Natural aquatic areas	Pollinator areas	Vegetation areas	Livestock areas
Up to a maximum of 2000 mL/ha	**0**	**30**	**0**	**10**	**0**

DIRECTIONS FOR USE

CROP	WEED	WEED STAGE	RATE	CRITICAL COMMENTS
USE ONLY WITH LIBERTYLINK® CANOLA VARIETIES (WITH TOLERANCE TO LIBERTY® ULTRA HERBICIDE).				
LibertyLink® Canola varieties (with tolerance to Liberty® Ultra Herbicide) Apply Liberty Ultra ® Herbicide to crop from	Annual ryegrass (*Lolium rigidum*)	2 to 4 leaf/start of tillering (Z12 to Z21)	1.1 L/ha followed by 1.1 L/ha 7 - 14 days later **OR** 1.6 L/ha followed by 1.6 L/ha 7 - 14 days later	Apply Liberty® Ultra Herbicide to crop from cotyledons fully expanded through to early bolting stage. **IT IS ESSENTIAL TO COMPLETE BOTH APPLICATIONS.** The sequential application is designed for a weed control program.

cotyledons fully expanded through to early bolting stage.	Barley grass (*Hordeum leporinum*), Brome grass (*Bromus* spp.)		0.8 L/ha followed by 0.8 L/ha 7 - 14 days later	Liberty® Ultra Herbicide does not provide residual weed control. Apply the second Liberty application 7 to 14 days after the first Liberty application. A shorter interval between applications will result in better weed control. Complete coverage of weeds is essential for good control. Poor coverage may result in re-growth. **Annual ryegrass** Use the higher rate of Liberty® Ultra Herbicide where the weed populations are high or growing conditions are less than ideal. For optimal annual ryegrass control in **Liberty Tolerant LibertyLink® Canola varieties**; applications of Liberty® Ultra Herbicide should be used in conjunction with pre- and early post-emergence applications of suitable registered herbicides e.g. pre-emergence applications of metazachlor, propyzamide or trifluralin and post-emergence applications of clethodim on susceptible annual ryegrass.
	Capeweed (*Arctotheca calendula*)	2 to 8 leaf		
	Chickpea (*Cicer arietinum*), Corn gromwell (*Lithospermum arvense*), Doublegee/Spiny emex/ Three cornered jack (*Emex australis*), Field pea (*Pisum sativum*), Fumitory (*Fumaria* spp.), Lentil (*Lens culinaris*), Loosestrife (*Lythrum hyssopifolia*), Lupin/narrowleaf lupin (*Lupinus angustifolius*), Medic (*Medicago* spp.), Prickly lettuce (*Lactuca serriola*), Scotch thistle (*Onopordum acanthium*), Silver grass/squirrel-tailed fescue (*Vulpia myuros*)	2 to 4 leaf		
	Crassula/Stone crop (*Crassula* spp.)	2 to 8 leaf		**Wild radish** Do not apply to dense populations of wild radish (>25 weeds/m^2). **Seek advice from BASF Australia Ltd before using products other than Liberty® Ultra Herbicide on Dual Tolerant LibertyLink® Canola varieties**
	Subterranean clover (*Trifolium subterraneum*), Toad rush (*Juncus bufonius*), Tree hogweed (*Polygonum patulum*), Vetch (*Vicia sativa*)	2 to 4 leaf		
	Volunteer barley (*Hordeum vulgare*), Volunteer oats (*Avena sativa*), Volunteer wheat (*Triticum aestivum*)	2 leaf to 3 tillers (Z12 to Z23)		
	Wild oats (*Avena* spp.)	2 leaf to 2 tillers (Z12 to Z22)		
	Wireweed (*Polygonum aviculare*)	2 to 4 leaf		
	Yellow burweed/amsinckia (*Amsinckia intermedia*)	2 to 6 leaf		
	Suppression only Wild radish (*Raphanus raphanistrum*)	2 to 4 leaf	1.6 L/ha followed by 1.6 L/ha 7 to 14 days later	

CROP	WEED	WEED STAGE	RATE	CRITICAL COMMENTS

LibertyLink® Canola varieties (with tolerance to Liberty Ultra Herbicide) grown for seed production only	Non-tolerant canola plants	2 to 4 leaf 4 to 6 leaf up until time of bolting	2 L/ha followed by 2 L/ha 2 L/ha, if necessary	Two applications are required to remove the segregating wild type plants. A third application, if necessary, may be applied to the canola up until time of bolting. **Growers using Liberty® Ultra Herbicide for canola hybrid seed production do so under contract to BASF Australia Ltd or its agent(s).**

APPLICATION OF LIBERTY® ULTRA HERBICIDE TO CANOLA VARIETIES OTHER THAN LIBERTYLINK® CANOLA VARIETIES (WITH TOLERANCE TO LIBERTY® ULTRA HERBICIDE) WILL RESULT IN SEVERE CROP INJURY OR DEATH OF THE CROP.

SUMMER FALLOW SITUATIONS

CROP/ SITUATION	WEEDS	WEED STAGE	RATE	CRITICAL COMMENTS
Prior to starting a fallow, fallow maintenance and prior to planting; **Cereal grains** (including wheat, barley, oats, maize and sorghum) **Pulses** (including chickpeas, faba beans, field peas, lentils, lupins and mungbeans), **Oilseeds** (including canola, cotton, soybeans and sunflowers) Do not sow crops until 1 day or more has elapsed after the final application.	Control of: Annual ryegrass (*Lolium rigidum*), Annual polymeria (Polymeria spp.) , Bellvine (*Ipomoea* plebeia), Bladder ketmia (*Hibiscus trionum*), Caltrop (*Tribulus terrestris*), Dwarf amaranth *(Amaranthus macrocarpus*), Field bindweed (European bindweed) *(Convolvulus arvensis),* Flax-leaf fleabane (*Erigeron bonariensis)*, Paddy melon (*Cucumis myriocarpus*), Peach vine (*Ipomoea lonchophylla*), Red pigweed (*Portulaca* spp.), Rhyncho (Rhyncosia sSpp.), Sesbania pea (*Sesbania* spp.*)*, Sowthistle (Milk thistle) (*Sonchus oleraceus*), Volunteer cotton (*Gossypium hirsutum*) (other than glufosinate tolerant cotton), Yellow vine (*Tribulus micrococcusterrestris*) Suppression of: Chinese lantern (Wild gooseberry) (*Physalis minima*) , Noogoora burr complex *(Xanthium* spp.*)*	2-6 leaf Grass weeds: pre-tillering	2 L/ ha in a minimum of 100 L water	Apply to actively growing weeds. Good coverage is essential. Refer '**Application'** section for details. **DO NOT** apply more than three applications per season. Liberty Ultra will have an effect on weeds that are larger than the recommended leaf stage, but speed of activity and level of control may be reduced. **CLIMATIC CONDITIONS** **Best results are achieved when Liberty Ultra is applied under warm humid conditions** (temperatures below 33 °C with a relative humidity above 50 %). Under any other conditions efficacy and speed of action may be reduced.

OPTICAL SPOT SPRAY TECHNOLOGIES (OSST)
Note: Calibrate the sprayer to spray the equivalent of 100 L/ha. DO NOT apply greater than 37L of spray mixture per hectare through OSST equipment (2L of product per hectare)

CROP/ SITUATION	WEEDS	WEED STAGE	RATE	CRITICAL COMMENTS
Prior to starting a fallow, fallow maintenance and prior to planting; Cereal grains (including wheat, barley, oats, maize and sorghum), Pulses (including chickpeas, faba beans, field peas, lentils, lupins and mung beans), Oilseeds (including canola, cotton, soybeans and sunflowers) Do not sow crops until 1 day or more has elapsed after the final application.	Awnless barnyard grass *(Echinochloa colona)* Feathertop Rhodes grass (*Chloris virgata*) Milkthistle/Sowthistle *(Sonchus oleraceus)* Pigweed *(Portulaca oleracea*) Stinkgrass *(Eragrostis cilianensis)* Windmill grass *(Chloris truncata*)	Budding/seed head emergence – active flowering	4 - 5.4 L/100 L	Apply to actively growing weeds. Good coverage is essential. Refer to Application section for details. Where rate range occurs use higher rate for actively flowering plants DO NOT apply more than three applications per season. Liberty Ultra will affect weeds that are larger than the recommended leaf stage, but speed of activity and level of control may be reduced. CLIMATIC CONDITIONS Best results are achieved when Liberty Ultra is applied under warm humid conditions (temperatures below 33°C with a relative humidity above 50%). Under any other conditions efficacy and speed of action may be reduced.
	Dwarf amaranth *(Amaranthus macrocarpus*) Bladder ketmia (*Hibiscus trionum*) Flaxleaf fleabane (*Erigeron bonariensis*) Liverseed grass (*Urochloa panicoides*)	Up to active flowering	5.4 L/100 L	

NOT TO BE USED FOR ANY PURPOSE, OR IN ANY MANNER, CONTRARY TO THIS LABEL UNLESS AUTHORISED UNDER APPROPRIATE LEGISLATION.

GENERAL INSTRUCTIONS

Liberty® Ultra Herbicide is a non-volatile herbicide with selective activity against many annual and perennial broadleaf weeds and grasses in LibertyLink® Canola varieties that are specially developed to be tolerant to Liberty® Ultra Herbicide.

Apply Liberty Ultra® Herbicide to the LibertyLink® Canola from cotyledon to early bolting stage. Liberty® Ultra Herbicide is absorbed by plant foliage and green stems. It is inactive in soil and does not provide residual weed control. Liberty Ultra ® Herbicide is not significantly translocated as an active herbicide throughout the plant, and therefore will only kill that part of a green plant that is contacted by spray. The shorter interval between applications will give better weed control. Best results are achieved when applications are made under good growing conditions to young, actively growing weeds. Liberty® Ultra Herbicide will have an effect on weeds that are larger than the recommended leaf stage, but speed of activity and control may be reduced. Application to weeds under stress (e.g. due to continuous severe frosts, dry or waterlogged conditions, windblasted, insect damaged, nutrient deficient or diseased conditions) should be avoided.

Climatic Conditions

Best results are achieved when Liberty Ultra ® Herbicide is applied under mild humid conditions. Poor results may occur under hot, dry conditions. Under cool (below 10˚C), dry and low relative humidity conditions speed of action and control may be reduced.

Symptoms
Visible symptoms of weed control appear in 3 to 7 days, but complete desiccation may take 20 to 30 days under cool conditions. Minor transient crop effects may be visible after application of Liberty® Ultra Herbicide to LibertyLink® Canola varieties (with tolerance to Liberty Ultra ® Herbicide).

Mixing Instructions

Liberty Ultra ® Herbicide mixes easily with water. Clean water should always be used for mixing with Liberty Ultra ® Herbicide. Ensure that the spray tank is free of any residues of previous spray materials. Maintain agitation whilst filling the tank and throughout the spraying operation.

Liberty Ultra ® Herbicide is a soluble concentrate (**SL**) formulation. When using in a tank mix with other products the following mix order should be observed;

1. Partly fill the spray tank with water, as per label directions, to at least 70% full. **Commence agitation**
and maintain agitation during the mixing and spraying process.
2. Add any **Water Conditioners.**
3. Add any **Wettable Powders (WP)** or **Dry Flowable (DF)** products
4. Add any **Water Dispersible Granules (WDG**) products.
5. **Add any Flowable Liquids (FL)** or **Suspension Concentrates (SC).**
6. Add any **Emulsifiable Concentrates (EC).**
7. Add any **Aqueous Concentrate (AC)** or **Soluble (Liquid) Concentrates (SL)** such as Liberty® Ultra Herbicide
8. Add **Adjuvant** if required.
9. Fill the remainder of the spray tank with water.

Use the spray mix within 24 hours of preparation (unless otherwise stated on label).

Use of Surfactant/Wetting agent
The addition of a surfactant is not required with Liberty® Ultra Herbicide.

Application Equipment
Ground Boom Sprayers Only
Aim to apply a thorough and even coverage of spray to the entire target plant. Dense stands of weeds should be thoroughly wetted with spray. Incomplete coverage due to e.g. stubble retention, crop plants or weed leaf to leaf overlap, may result in poor control. Equipment should be such that adequate coverage, penetration and volume of spray liquid can be achieved.

Liberty® Ultra Herbicide should be applied at the rate shown in the Directions for Use table in sufficient water to give thorough coverage of weeds. It is recommended that 80 to 100 L water/ha is applied with spray droplets of a MEDIUM droplet size category. In some situations (e.g. high weed density) increased water volumes are likely to give higher levels of weed control.

Sprayer cleanup
Clean all equipment after use by thoroughly flushing with water.

RECROPPING INTERVALS
Minimum recropping intervals apply for crops following Liberty Ultra ® Herbicide application.
For advice on crops not listed below, contact the manufacturer, BASF Australia Ltd.

Crop	**Minimum recropping interval**
Cereals, pulses, oilseeds	1day

Acronyms and abbreviations

Shortened term	Full term
ac	Active constituent
ADI	Acceptable daily intake (for humans)
ai	Active ingredient
ARfD	Acute reference dose
bw	Bodyweight
d	Day
DAT	Days after treatment
DFU	Direction for use
DT_{50}	Time taken for 50% of the concentration to dissipate
EA	Environment Australia
E_bC_{50}	Concentration at which the biomass of 50% of the test population is impacted
EC_{50}	Concentration at which 50% of the test population are immobilised
E_rC_{50}	Concentration at which the rate of growth of 50% of the test population is impacted
g	Gram
GAP	Good Agricultural Practice
GLP	Good Laboratory Practice
h	Hour
ha	Hectare
HPLC	High pressure liquid chromatography *or* high performance liquid chromatography
IPM	Integrated pest management
in vitro	Outside the living body and in an artificial environment
in vivo	Inside the living body of a plant or animal
kg	Kilogram
K_{OC}	Organic carbon partitioning coefficient

Shortened term	Full term
L	Litre
LC_{50}	Concentration that kills 50% of the test population of organisms
LD_{50}	Dosage of chemical that kills 50% of the test population of organisms
LOD	Limit of detection – level at which residues can be detected
Log K_{OW}	Log to base 10 of octanol water partitioning co-efficient, synonym P_{OW}
LOQ	Limit of quantitation – level at which residues can be quantified
mg	Milligram
MOE	Margin of exposure
mL	Millilitre
MRL	Maximum Residue Limit
NEDI	National Estimated Daily Intake
NESTI	National Estimated Short-Term Intake
ng	Nanogram
NOEC/NOEL	No observable effect concentration level
NOAEL	No observed adverse effect level
OC	Organic carbon
OPHEC	US EPA Occupational Pesticide Re-entry Calculator
OPREC	US EPA Occupational Pesticide Re-entry Calculator
PPE	Personal protective equipment
ppm	Parts per million
Q-value	Quotient-value
RAL	Regulatory Acceptable Level
REI	Re-entry interval
s	Second
SL	Soluble concentrate
SDMT	Spray Drift Management Tool
SDRAT	Spray Drift Risk Assessment Tool

Shortened term	Full term
SDS	Safety Data Sheet
SUSMP	Standard for the Uniform Scheduling of Medicines and Poisons
TGA	Therapeutic Goods Administration
TGAC	Technical grade active constituent
µg	Microgram
WG	Water dispersible granule
WHP	Withholding period
Shortened term	Full term
ac	Active constituent
ADI	Acceptable daily intake (for humans)
ai	Active ingredient
ARfD	Acute reference dose
bw	Bodyweight
d	Day
DAT	Days after treatment
DFU	Direction for use
DT_{50}	Time taken for 50% of the concentration to dissipate
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E_bC_{50}	Concentration at which the biomass of 50% of the test population is impacted
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E_rC_{50}	Concentration at which the rate of growth of 50% of the test population is impacted
g	Gram
GAP	Good Agricultural Practice
GLP	Good Laboratory Practice
h	Hour

Glossary

Term	Description
Active constituent	The substance that is primarily responsible for the effect produced by a chemical product
Acute	Having rapid onset and of short duration
CAS registry number	Unique numerical identifier assigned by the Chemical Abstracts Service (CAS) to every chemical substance
Carcinogenicity	The ability to cause cancer
Chronic	Of long duration
Codex MRL	Internationally published standard maximum residue limit
Efficacy	Production of the desired effect
Formulation	A combination of both active and inactive constituents to form the end use product
Genotoxicity	The ability to damage genetic material
Hydrophobic	Repels water
Metabolism	The chemical processes that maintain living organisms
Toxicology	The study of the nature and effects of poisons
Term	Description

References

APVMA (2023). Spray Drift Risk Assessment Tool (SDRAT) – Version 1.1. Australian Pesticides and Veterinary Medicines Authority. https://apvma.gov.au/node/28086.

EFSA (2022) Guidance on the assessment of exposure of operators, workers, residents and bystanders in risk assessment of plant protection products. *EFSA Journal* 20(1):7032. https://efsa.onlinelibrary.wiley.com/doi/10.2903/j.efsa.2022.7032

Health (2025). Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP). Legislative Instrument - The Poisons Standard. Australian Federal Government Department of Health and Aged Care. https://www.tga.gov.au/publication/poisons-standard-susmp

OECD (2004a). Test No. 428: Skin absorption: *In vitro* method. https://www.oecd.org/en/publications/2004/11/test-no-428-skin-absorption-in-vitro-method_g1gh4b52.html

OECD (2004b). Guidance document for the conduct of skin absorption studies. https://www.oecd.org/en/publications/guidance-document-for-the-conduct-of-skin-absorption-studies_9789264078796-en.html.

US EPA (2012) Residential (Handler) SOPs https://www.epa.gov/pesticide-science-and-assessing-pesticide-risks/standard-operating-procedures-residential-pesticide#sops

US EPA (2021a). Occupational Pesticide Handler Exposure Calculator (OPHEC) (version date: May 2021). Occupational Pesticide Handler Exposure Data | Pesticide Science and Assessing Pesticide Risks | US EPA https://www.epa.gov/sites/production/files/2021-05/opp-hed-occupational-handler-exposure-may-2021.xlsx

US EPA (2021b). Occupational Pesticide Re-entry Exposure Calculator (OPREC). https://www.epa.gov/sites/production/files/2021- 3/hed_exposac_policy_3_occupational_pesticide_re-entry_exposure_calculator_march2021_0.xlsx